EXHIBIT C

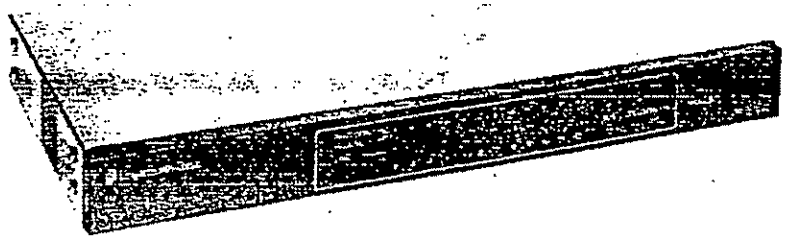
3-17-93
from Wyn Gary

Ungermann-Bass

Access/Hub

ASE1000 Family

SNMP-Managed 12-port Ethernet on Twisted-Pair Workgroup Concentrator



Features

- Low-cost, SNMP-managed workgroup concentrator
- Twelve 10Base-T connections over shielded or unshielded twisted-pair wire
- Simple plug-and-play architecture for ease of installation
- Cascade capability expands your Ethernet network
- Standards-based architecture preserves your network investment

Low-Cost, SNMP-Managed Workgroup Concentrator

The ASE1000 Access/Hub provides low-cost, reliable connectivity for 10Base-T Ethernet networks. Its architecture provides optional network management, enabling you to configure your network to minimize costs. The Access/Hub is available in two versions: an entry-level unmanaged hub or a Simple Network Management Protocol (SNMP) managed hub.

The unmanaged hub is ideal for small departmental or remote site Ethernet networks (up to 132 workstations) and can be easily upgraded to support SNMP with a field-installable daughter card. The SNMP version enables you to efficiently monitor, control, and configure the Access/Hub using the Ungermann-Bass NetDirector® management platform or any third-party SNMP manager. The SNMP version supports MIB I, MIB II, and Ungermann-Bass MIB extensions. Both the unmanaged and SNMP versions include LEDs that provide onboard diagnostics.

Twelve 10Base-T Connections Over Shielded or Unshielded Twisted-Pair Wire

With the Access/Hub, you can connect up to 12 PCs, PS/2 systems, Macintosh computers, and UNIX workstations over a 10Base-T Ethernet network using shielded or unshielded twisted-pair wire. The hub also works with any network operating system.

Cascade Capability Expands Your Ethernet Network

It is easy to extend your network as your connectivity needs expand. The cascade feature enables you to link additional Access/Hubs (figure 1), supporting up to 132 Ethernet ports through RJ-45 outlets and up to 144 Ethernet ports through an AUI interface.

Simple Plug-and-Play Architecture for Ease of Installation

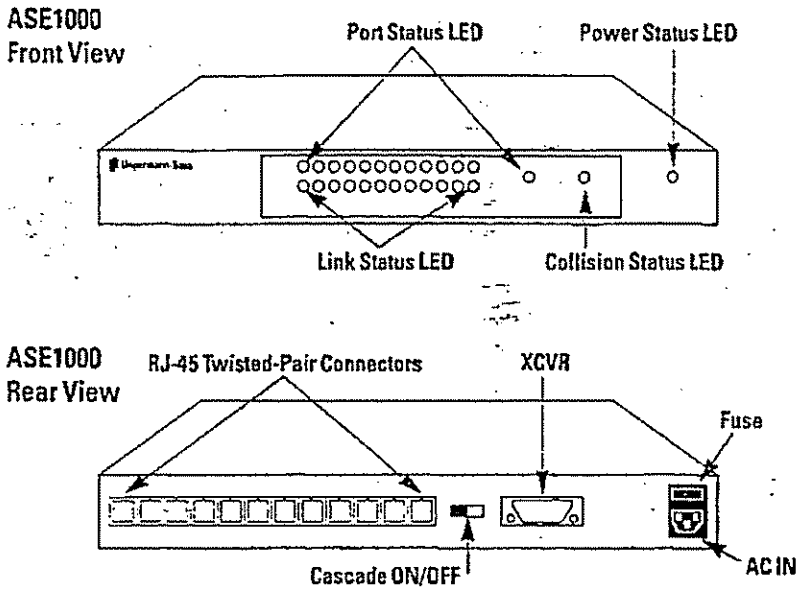
The Access/Hub is easy to install – just plug it in. No configuration is required. You do not need any technical assistance or special tools. The configuration information for the SNMP managed hub is stored in an EEPROM and can be updated at any time using a BOOTP/TFTP server.

The compact design of the Access/Hub enables you to mount it on a rack, a wall, or place it on a desktop.

Standards-Based Architecture Preserves Your Network Investment

The Access/Hub is compatible with the IEEE 10Base-T standard and the IEEE 802.3 K Repeater draft standard, providing investment protection and high network availability.

Connections, Controls and Indicators



Specifications

Indicators and Switches

Port-status LEDs: IEEE 802.3 10Base-T twisted-pair ports and AUI IEEE 802.3 10Base-5 port

Green indicates receiving data

Orange indicates auto-segmentation

Power-status LED

Green indicates power is being applied and that the internal power is present

Green also indicates the status of the managed unit

Collision-status LED

Orange indicates collision

OFF indicates no collisions

Link-status LED: RJ-45 connector, twisted-pair port

Detects wiring faults between the device and concentrator and checks electric circuitry

Green indicates link integrity test passes or that it is disabled

OFF indicates link integrity test fails

Cabling Systems

Certified for operation with the AT&T PDS system and IBM cables for shielded and unshielded twisted-pair wiring

Connections

Ports: 10Base-T RJ-45 connector cable (12 ports)

Backbone connection: One 10Base-5 AUI connector Ethernet Version 2 or IEEE 802.3 (10Base-5); product is set to Ethernet at the factory. AUI port can be configured with SQE (default is off).

Fault resolution capacity: Auto-segmentation of affected port in case of network problem. The port is automatically activated when the network problem is resolved.

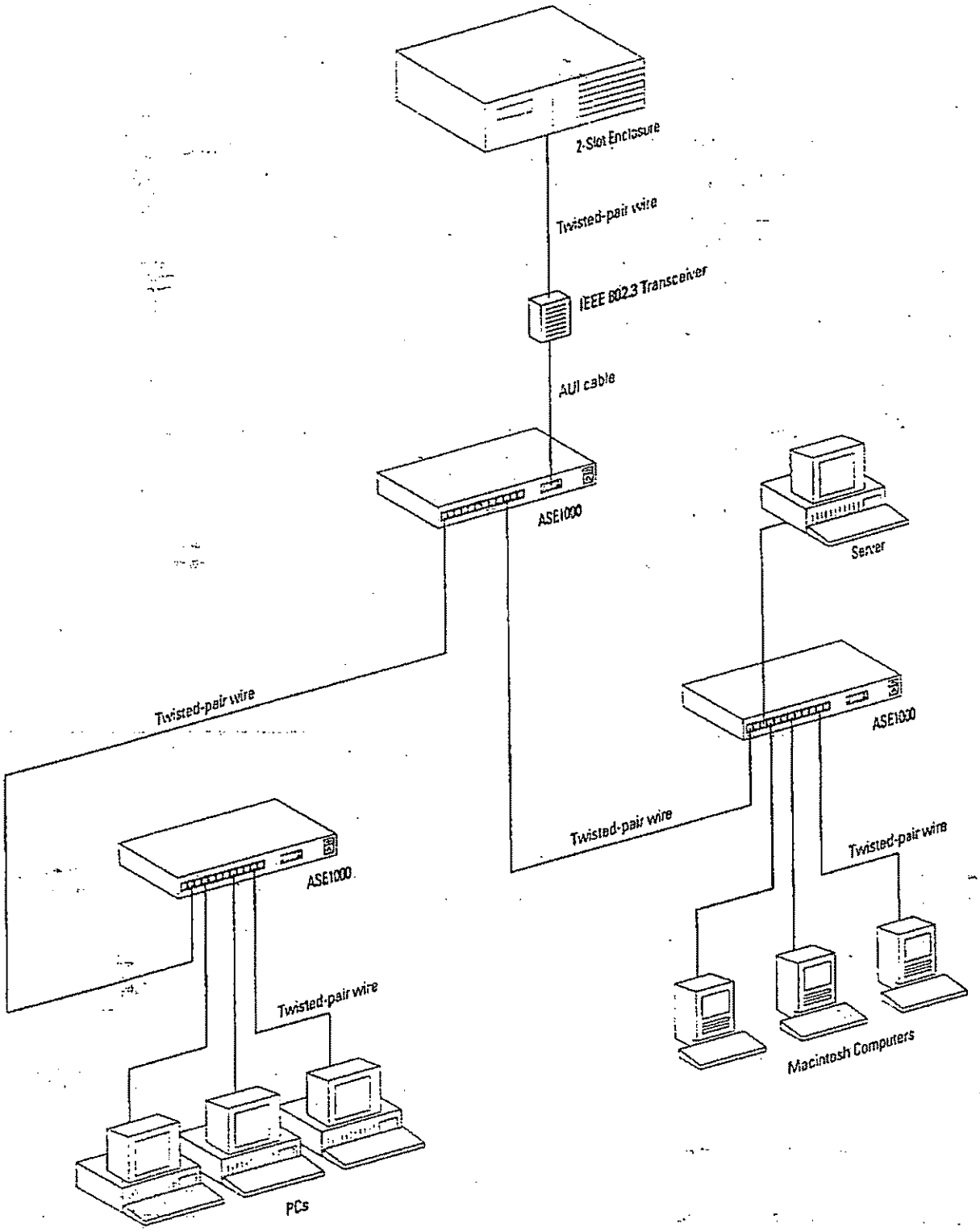
Cascade ON/OFF

ON indicates that "port 12" will act as a concentrator for the other RJ-45 ports.

OFF indicates that "port 12" will act the same as ports 1–11.

The cascade function of "port 12" allows eleven ports to be cascaded into a single port of another ASE1000 to provide up to 132 connections.

Cascade Configuration for the ASE1000 10Base-T Intelligent Workgroup Hubs



Specifications continued

SNMP Optional Daughter Card

Factory or field installable option

Resident Ethernet agent

The network configuration is stored in an updatable, nonvolatile memory (EEPROM).

Compliant with MIB I and MIB II and Ungermann-Bass extensions.

Power

Inputs: 100 V AC to 260 V AC, 50/60 Hz (auto-ranging supply)

Consumption: 50 W (maximum)

Physical Characteristics

Height: 43 mm (1.7 inches)

Width: 420 mm (16.5 inches)

Depth: 192.5 mm (7.6 inches)

Weight: 3.2 kg (7.1 lb)

Note: rubber feet may be attached, increasing the height slightly

Operating Environment

Temperature: 0°C to 40°C (32°F to 104°F), outside ambient

Relative humidity: 20% to 80%, noncondensing

Storage Environment

Temperature: -20°C to 65°C (-4°F to 149°F), outside ambient

Relative humidity: 5% to 90%, noncondensing

Accessories (included)

Power cord

Rack/wall mount bracket (one set)

Rubber feet

Installation and Operation Guide

Configuration and download software (ASE1000/115M, ASE1000/230M, and ASE1/UM only)

SNMP Management Module Installation and Operation Guide (ASE1000/115M, ASE1000/230M, and ASE1/UM only)

Agency Compliance

Complies with FCC, Part 15, and EN 55 022 (CISPR 22), Class A emission limits.

Complies with UL 1950, CSA C22.2, No. 950, and EN 60950 safety standards.

Predicted Reliability

MTBF: 135,000 hr

Ordering Information

ASE1000/115: 115 V, entry-level unmanaged hub

ASE1000/230: 230 V, entry-level unmanaged hub

ASE1000/115M: 115 V, SNMP managed hub with BOOTP/TFTP download and configuration software

ASE1000/230M: 230 V, SNMP managed hub with BOOTP/TFTP download and configuration software

ASE1/UM: Optional, field installable, SNMP daughter card with BOOTP/TFTP download and configuration software

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DS-039-01 40K FP 3/92

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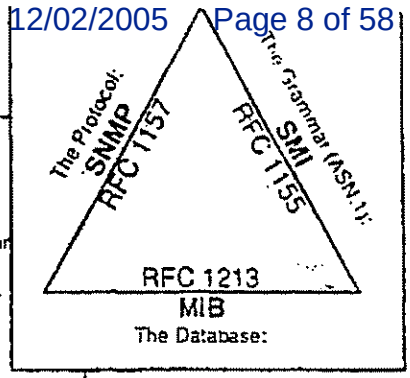
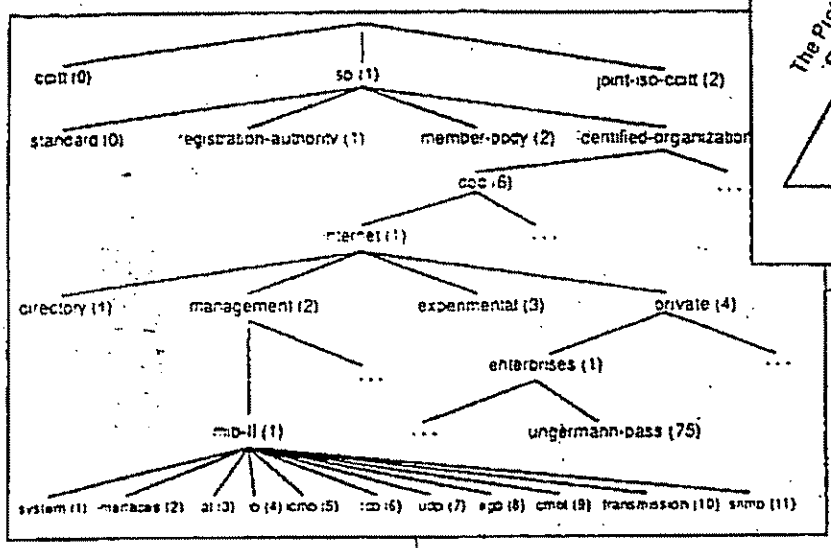
MANAGED ACCESS/HUB

- Works with any SNMP manager
- DOS-based download and configuration
- Configuration is stored in EEPROM and is present even after a power outage
- Compatible with IEEE 802.3K Repeater draft "hub management" standard

ACCESS/HUB

- 12-port 10Base-T Concentrator with AUI connection
- Unmanaged hub or SNMP managed hub
- Unmanaged hub can be upgraded to SNMP management at any time
- Great price/performance
- Ideal for EOTP-only departments who want simple, plug-n-play connectivity





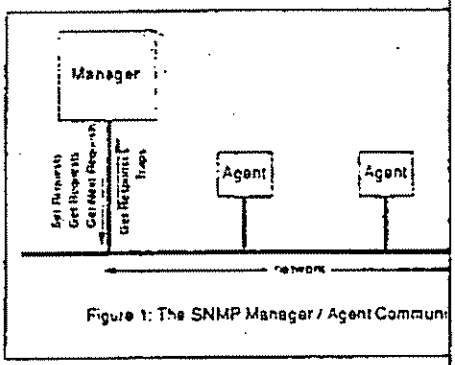


Figure 1: The SNMP Manager / Agent Commun

```
Status:
    mandatory.

OBJECT:
------
    ipRouteEntry { ipRoutingTable 1 }

Syntax:
    IpRouteEntry ::= SEQUENCE {
        ipRouteDest
            IpAddress,
        ipRouteIfIndex
            INTEGER,
        ipRouteMetric1
            INTEGER,
        ipRouteMetric2
            INTEGER,
        ipRouteMetric3
            INTEGER,
        ipRouteMetric4
```

```
Definition:
    A route to a particular destination.

Access:
    read-write.

Status:
    mandatory.

We now consider the individual components
IP Routing table:

OBJECT:
------
    ipRouteDest { ipRouteEntry 1 }

Syntax:
    IpAddress

Definition:
    The destination IP address of this r
    a value of 0.0.0.0 is considered a m
    multiple routes to a single destinati
    table, but access to such multiple en
    on the table-access mechanisms defin
    management protocol in use.

Access:
    read-write.

Status:
    mandatory.
```

SNMP Concepts

Presentation Handouts

Ungermann-Bass Worldwide Technical Conference
November 6, 1991 — November 13, 1991

SNMP Concepts

- § SNMP Concepts
  - § WHAT is SNMP?
    - Simple Network Management Protocol
    - A standards-based protocol that has become the de-facto standard for management of TCP/IP networks
  - § WHY is SNMP necessary?
    - Network management has become increasingly complex.
    - Standards-based management allows a single console/vendor to control a variety of devices.
  - § HOW is SNMP implemented?
    - § The Protocol
      - § Managers and Agents
        - An SNMP manager is a set of software programs running on a management station that allows a network administrator to manage network devices.
        - An SNMP agent is any managed object on the network.
      - § PDUs
        - § Get-Request, Set-Request
          - Allow the manager to retrieve and set attributes on any agent
          - Examples:
            - Find out the operational status of a bridge link
            - Set the power-up mode of a device so that it runs power-on diagnostics and requests a download
        - § Get-Response
          - A PDU sent by an agent to a manager detailing the result of a preceding Set or Get
          - Get-Responses are keyed so that the manager can match them with previous Sets or Gets.
          - Examples:
            - an agent responds to a Get-Request for link status with a "link up"
            - an agent responds to a Set-Request with a "badValue" error
        - § Get-Next
          - A variation of the Get-Request PDU that allows for table traversal by returning the "lexicographically next" object from an agent's MIB
          - § Example
            - Get the operational status of each card in an Access/One enclosure
              - do a Get-Next on the operational status column (column 3)

- agent responds with the operational status of the card in slot 1
- do another Get-Next with slot 1
- agent responds with the operational status of the card in slot 2
- continue process until the agent responds with value for column 4, row 1

§ Why Have a Get-Next?

§ Traps
- Allow an agent to send unsolicited messages to a manager
- Typically used to notify network manager of critical malfunctions and exceptional conditions

§ Generic Traps
- SNMP provides generic traps for common problems and conditions
  - coldStart
  - warmStart
  - linkDown
  - authenticationFailure
  - egpNeighborLoss

§ Vendor-Specific Traps
- SNMP allows vendors to define their own traps
- U-B has defined at least 26 vendor-specific traps. A few examples:
  - BadPowerSupply
  - ModuleHighTemperature
  - BeaconDetected

§ Security
- Community name defines a relationship between an agent and one or more managers
- Receiving SNMP entities check the community name in incoming messages. If the community name is known to the entity, the sending entity is authenticated.
- This "trivial" authentication scheme is targeted for enhancement in future revisions of the protocol.

§ Protocol Mapping
- UDP at the Transport layer
- IP is the default Network layer protocol.
- SNMP can be mapped onto TCP and the OSI CLTS protocol, and even directly onto Ethernet.

§ Proxy Agents
- Allow for control of devices that don't support SNMP
- Two kinds of proxy agents

- Application gateway agents translate management queries to SNMP from some other protocol.
- Protocol gateway agents translate Network and Transport layer protocols into IP and UDP.

- Proxy agents also allow network managers to control multiple devices via interaction with a single agent (C-B Proxy Agent on the Supervisor)

§ MIBs
- Management Information Base that defines manageable SNMP attributes, or objects

§ SNMP Objects
- Each object has a ...
  - Name - follows the Object Identifier rules (described later)
  - Syntax - what kind of object; i.e. integer, string, IP address
  - Definition - text description of object
  - Access - read-only, read-write, write-only or not-accessible
  - Status - mandatory, optional or obsolete

§ The Registration Tree
- The ISO/CCITT registration tree provides a potential place for all manageable attributes (similar to hard disk directory structure).
- Vendor-specific attributes are registered in the private-enterprises subtree.
- All nodes must be uniquely named, even if they're in different parts of the tree.

§ Registration Tree - A Graphical Look

§ OIDs
- An object's OID describes where in the registration tree it resides.
- Since all tree nodes are uniquely named, OIDs can be specified in various ways"
  - sysLocation.0
  - 1.3.6.1.2.1.1.6.0
  - mib-2.system.6.0
- When SNMP packets are encoded, only the full integer representation is used:

§ MIB II vs Private MIBs
- "MIB" has several slightly different meanings - leads to confusion.
  - In the generic sense, MIB simply refers to an agent's set of supported objects.
  - In the IAB sense, MIB (or MIB II) refers to the adopted set of universal objects under the "management" node on the registration tree.

- In the specific vendor sense, MIB refers to the set of objects defined by individual vendors under the "private" node (e.g. "cisco's MIB", "UB's MIB", "Wellfleet's MIB").
- How to incorporate another vendor's MIB to manage their products is THE ISSUE!

§ ASN.1
- Abstract Syntax Notation One
- ASN.1 is a formal OSI language used by SNMP to describe MIBs and encode data.
- ASN.1 was chosen "to ease the transition to OSI network management."

§ WHO developed SNMP?

§ SGMP Birth
- March 1987: Proteon and others begin development of Simple Gateway Monitoring Protocol (SGMP).
- January 1988: First station manager package available
- February 1988: SGMPapplication spreads to monitoring of end systems (hosts, servers etc.)

§ IAB Adoption
- March 1988: IAB adopts SGMP as step in migration path to OSI management
- March-August 1988: SGMP is enhanced and renamed SNMP

§ RFCs
- August 1988: First RFCs
  - RFC 1065 - SMI (McCloghrie and Rose)
  - RFC 1066 - MIB (McCloghrie and Rose)
  - RFC 1067 - SNMP (Case, Fedor, Schoffstall, Davin)
- April 1989: elevated to recommended status

§ Growth Measured at Interop
- October 1989: over 20 vendors demo SNMP products
- October 1990: 50 vendors
- October 1991: virtually everyone supporting SNMP

§ The Future
- Improvements in security and manager-to-manager capabilities are currently in the works.
- MIBs are changing much more frequently than the protocol itself.
- Migration to CMIP (?)
  - The once-imminent transition to CMIP is threatened by SNMP's unexpected popularity.
  - Several Interop '91 vendors demonstrated CMOT (CMIP over TCP/IP) as an SNMP alternative.

```
UB-MIB-ASM320 { iso org(3) dod(6) internet(1) 4 1 75 8 2 }

DEFINITIONS ::= BEGIN
        IMPORTS
                Counter, TimeTicks FROM RFC1155-SMI
                DisplayString FROM RFC1158-MIB-II
                PhysAddress FROM RFC1213;

ubNode              OBJECT IDENTIFIER    ::= { enterprises 75 }
ubExperimental      OBJECT IDENTIFIER    ::= { ubNode  6 }

UniqueIdentifier                                    ::= INTEGER (1..65535)

asm320Prelim        OBJECT IDENTIFIER    ::= { ubExperimental asm320(3)}
ubExtensions                OBJECT IDENTIFIER    ::= { ubNode 7 }
ubHm                        OBJECT IDENTIFIER    ::= { ubExtensions 1 }

hmBasicCapability           OBJECT IDENTIFIER    ::= { asm320Prelim 1 }
hmMonitorCapability OBJECT IDENTIFIER    ::= { asm320Prelim 2 }
hmAddrTrackCapability OBJECT IDENTIFIER  ::= { asm320Prelim 3 }
ubHmBasicCapability OBJECT IDENTIFIER    ::= { ubHm 1 }
ubHmMonitorCapability OBJECT IDENTIFIER  ::= { ubHm 2 }
ubHmAddrTrackCapability     OBJECT IDENTIFIER    ::= { ubHm 3 }

hmBasicHub                  OBJECT IDENTIFIER    ::= { hmBasicCapability 1 }
hmBasicGroup        OBJECT IDENTIFIER    ::= { hmBasicCapability 2 }
hmBasicPort                 OBJECT IDENTIFIER    ::= { hmBasicCapability 3 }
hmMonitorHub        OBJECT IDENTIFIER    ::= { hmMonitorCapability 1 }
hmMonitorPort       OBJECT IDENTIFIER    ::= { hmMonitorCapability 2 }
hmAddrTrackPort             OBJECT IDENTIFIER    ::= { hmAddrTrackCapability 1 }

ubHmBasicGroup              OBJECT IDENTIFIER    ::= { ubHmBasicCapability 1 }
ubHmBasicPort       OBJECT IDENTIFIER    ::= { ubHmBasicCapability 2 }
ubHmMonitorGroup    OBJECT IDENTIFIER    ::= { ubHmMonitorCapability 1 }
ubHmMonitorPort             OBJECT IDENTIFIER    ::= { ubHmMonitorCapability 2 }

-- BASIC CONTROL CAPABILITY
-- Implementation of all variables in this group is mandatory for all managed hubs.
-- BASIC HUB
-- Row selection: the value of hmBasHubID.
-- The Hub group contains each card in a hub cluster, which is all the cards in an Access/One enclosure
that constitute a single repeater.  Examples are multiple ASM320's attached to the Ethernet backplane bus
to act as a single repeater (an Ethernet bus Hub Cluster, as well as single ASM320's not attached to the
this bus.
-- Any model of Ethernet concentrator (ASM320, ASM310, ASM300, TEC900, and FEC800) may belong
to a hub cluster.  When a card is added to an Ethernet bus hub cluster it retains its Group (card)
management data, but resets its Hub management data.
        hmBasicHubTable OBJECT-TYPE
                SYNTAX      SEQUENCE OF HmBasicHubEntry
                ACCESS      not-accessible
                STATUS      mandatory
                --@ hmBasHubID
                ::= { hmBasicHub 1 }
```

```
                SYNTAX      OCTET STRING (SIZE(1))
                ACCESS      read-only
                STATUS      mandatory
                ::= { ubHmMonitorPortEntry 6 }

        ubHmMonitorPortMissingSFDs OBJECT-TYPE
-- The number of times this port detects a double-zero before a start frame delimiter.
                SYNTAX      Counter
                ACCESS      read-only
                STATUS      mandatory
                ::= { ubHmMonitorPortEntry 7 }

        ubHmMonitorPortOutOfRngLenFlds OBJECT-TYPE
-- The number of frames with a length field whose value is greater than the maximum value allowed for
LLC frames (1500 or 5DC hex). This could be used to count Ethernet frames (length fields whose values
are 600 hex or greater). Note these frames will also be counted as hmMonPortReadableFrames.
                SYNTAX      Counter
                ACCESS      read-only
                STATUS      mandatory
                ::= { ubHmMonitorPortEntry 8 }

        ubHmMonitorPortTotalOctets OBJECT-TYPE
-- The number of hmMonPortReadableOctets plus other octets (not data or padding) in frames counted by
hmMonPortReadableFrames.
                SYNTAX      Counter
                ACCESS      read-only
                STATUS      mandatory
                ::= { ubHmMonitorPortEntry 9 }


-- SQE CAPABILITY

-- Implementataion of this group is optional, but within the group all elements are mandatory. If a
managed hub implements any part of this group, the entire group shall be implemented.


--ADDRESS TRACKING CAPABILITY


-- Implementation of this group is optional, but within the group all elements are mandatory. If a
managed hub implements any part of this group, the entire group shall be implemented.
-- PORT

        hmAddrTrackPortTable OBJECT-TYPE
                SYNTAX      SEQUENCE OF HmAddrTrackPortEntry
                ACCESS      not-accessible
                STATUS      mandatory
                --@ hmAddrTrackPortGroupID, hmAddrTrackPortID
                ::= { hmAddrTrackPort 1 }

        hmAddrTrackPortEntry OBJECT-TYPE
                SYNTAX      HmAddrTrackPortEntry
```

```
                ACCESS          not-accessible
                STATUS          mandatory
                --@ hmAddrTrackPortGroupID, hmAddrTrackPortID
                ::= { hmAddrTrackPortTable 1 }

        HmAddrTrackPortEntry ::= SEQUENCE {
                hmAddrTrackPortGroupID                          INTEGER,
                hmAddrTrackPortID                       INTEGER,
                hmAddrTrackPortLastSrcAddress           PhysAddress,
                hmAddrTrackPortSrcAddrChanges           Counter
        }

        hmAddrTrackPortGroupID OBJECT-TYPE
-- The relative slot number in an enclosure, starting with 1.  This value is not greater than
hmBasHubGroupCapacity.

                SYNTAX          INTEGER (1..11)
                ACCESS          read-only
                STATUS          mandatory
                ::= { hmAddrTrackPortEntry 1 }

        hmAddrTrackPortID OBJECT-TYPE
-- The relative position of a port within a card starting with 1.  The AUI port identifier is 13.
                SYNTAX          INTEGER (1..13)
                ACCESS          read-only
                STATUS          mandatory
                ::= { hmAddrTrackPortEntry 2 }

        hmAddrTrackPortLastSrcAddress OBJECT-TYPE
        -- The source address of the last readable frame received by this port.
                SYNTAX          PhysAddress     (SIZE(6))
                --@formatg%0,1:02x %1,1:02x %2,1:02x %3,1:02x %4,1:02x %5,1:02x
                ACCESS          read-only
                STATUS          mandatory
                ::= { hmAddrTrackPortEntry 3 }

        hmAddrTrackPortSrcAddrChanges OBJECT-TYPE
        -- The number of times that the value of hmAddrTrackPortLastSrcAddress has changed.
                SYNTAX          Counter
                ACCESS          read-only
                STATUS          mandatory
                ::= { hmAddrTrackPortEntry 4 }

END
□
```

Feature

Unraveling SNMP Packets

By Dave Sorem

This article is the second in Dave Sorem's three-part series on SNMP. The first article ("SNMP. Why Not", July '91) covered the basics concepts of SNMP. This article takes a closer look at the protocol from the standpoint of transmission packet structure, and it is hoped that anyone requiring SNMP packet decodes will find this article particularly useful. It is assumed that you have read the first article, are familiar with protocol analyzers and their display, and are comfortable working with hexadecimal and binary notation.

In the first SNMP article that ran two issues ago, we stayed in the realm of the purely theoretical. That was a good place to start, but protocol analyzers don't capture theoretical packets. A good many of you have the capability to capture SNMP traffic but have no way to decode the information it contains. At this point you have three choices: 1) ignore the information and assume everything is ok, 2) read RFCs 1155, 1157 and 1158 (which are as difficult to decode as SNMP messages) or 3) read this article.

In one sense, decoding hexadecimal SNMP data is just like decoding most other protocols: certain byte (or bit) sequences correspond to certain "fields" within the packet, and the protocol itself defines what these field values mean. In another sense, SNMP is quite different. Most protocol headers allocate a fixed number of bytes for each field, making manual decodes rather simple. Since SNMP uses a subset of ASN.1's Basic Encoding Rules (BER), all fields are in theory of variable length. In practice this isn't usually so, but as an ISO protocol, SNMP's "self-describing" nature makes for some very adventurous decoding.

At first glance, an SNMP packet looks very familiar (see Figure 1 on the next page). There is the LLC/MAC header (14 bytes for Ethernet), the IP header, and then the rather short UDP header. The SNMP message appears as harmless "UDP data" to the average protocol analyzer, with the usual LLC/MAC trailer and CRC at the back end of the packet. Decoding IP and UDP headers is a trivial and probably familiar exercise to most readers, so we'll get right down to the SNMP data.

Within the SNMP message you find six fields and a variable-length list of variable bindings. It is in examining each of these fields that you realize how different SNMP is. For instance, if you are looking at an IP header and you want to know which transport layer protocol is embedded in the IP data, you look at the 24th byte in the Ethernet/IP packet. If it says "06" it's TCP, and if it says "11" it's UDP. The eight bits are all used to encode the field's value; there is no information on the field's type or length. And as long as the software responsible for decoding the packet knows the length and purpose of the field, there is no need to include a "description" of the field along with its value. This makes for efficient, compact packets, but is rather inflexible and places all responsibility for decoding in the hands of the destination protocol handler.

SNMP, descendant as it is from OSI and ASN.1, provides field *type* and *length* information along with every value it encodes. Formally, each field (or ASN.1 "type") consists of a *tag*, *length*, and

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TouchPath:

The Low Cost Data Path for Touch Memory

Access Control
Time & Attendance
Personnel Locating
Equipment Locating

PHONE VISION

from Precision Tracking FM, Inc.

Preproduction Draft Copy - specifications subject to change. Revision 1: 7/14/93

Contents:

TouchPath: Economical & Flexible

Access Touch Memory via Infrared Light or through a Touch Port

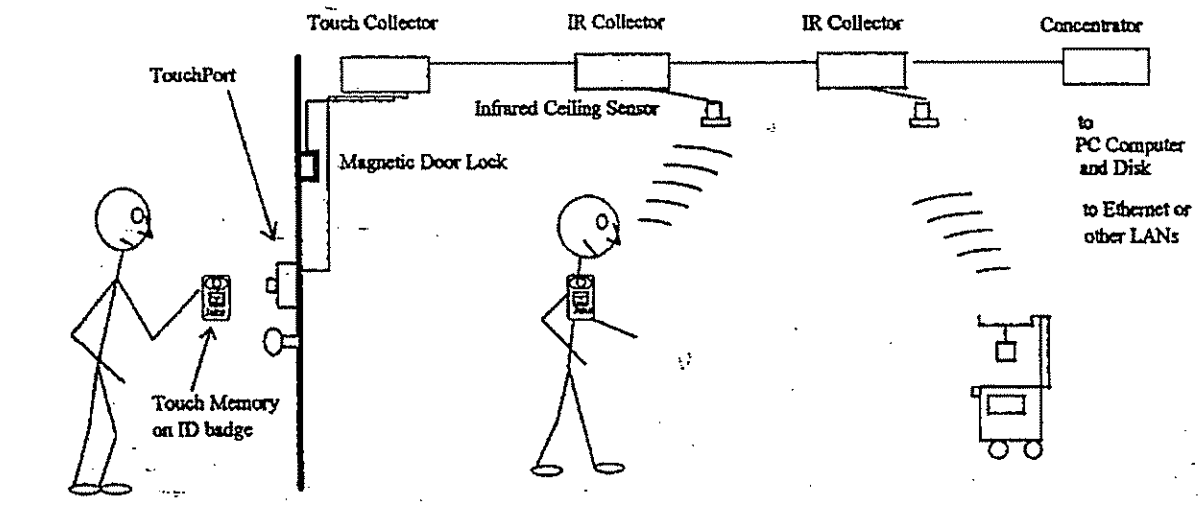
TouchPath provides a simple, yet fast, twisted pair data network at very low cost. The network can easily convey the contents of Touch Memories to a host computer.

The network is also capable of conveying other types of signals and controlling electrical devices such as door latches and lights.

A unique capability is the ability to convey signals over an infrared channel so that reading Touch Memory contents can be accomplished without physical contact.

Touch Memories can be accessed by physically touching them to a cup-shaped probe (TouchProbe) or by

Use TouchPath for Access Control and Location



transmitting the memory contents into ceiling or wall mounted sensors via infrared light.

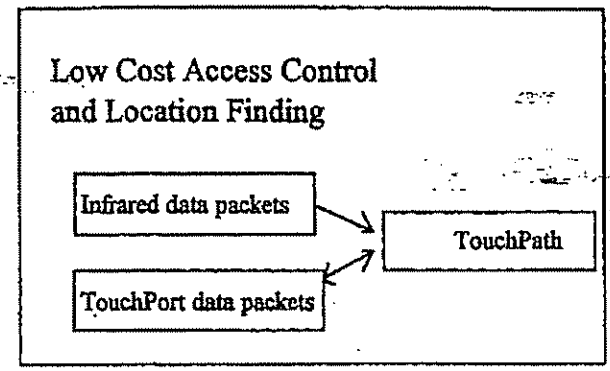
Low Cost Access Control, Locating, and Work Flow

The combination of the low-cost network and the mobility of Touch Memory means that information can be moved at an incredibly low price per access point for:

- Access Control
- Time & Attendance
- Personnel Locating
- Equipment Locating
- Workflow Automation

An example of personnel locating using TouchPath is PhoneVision.

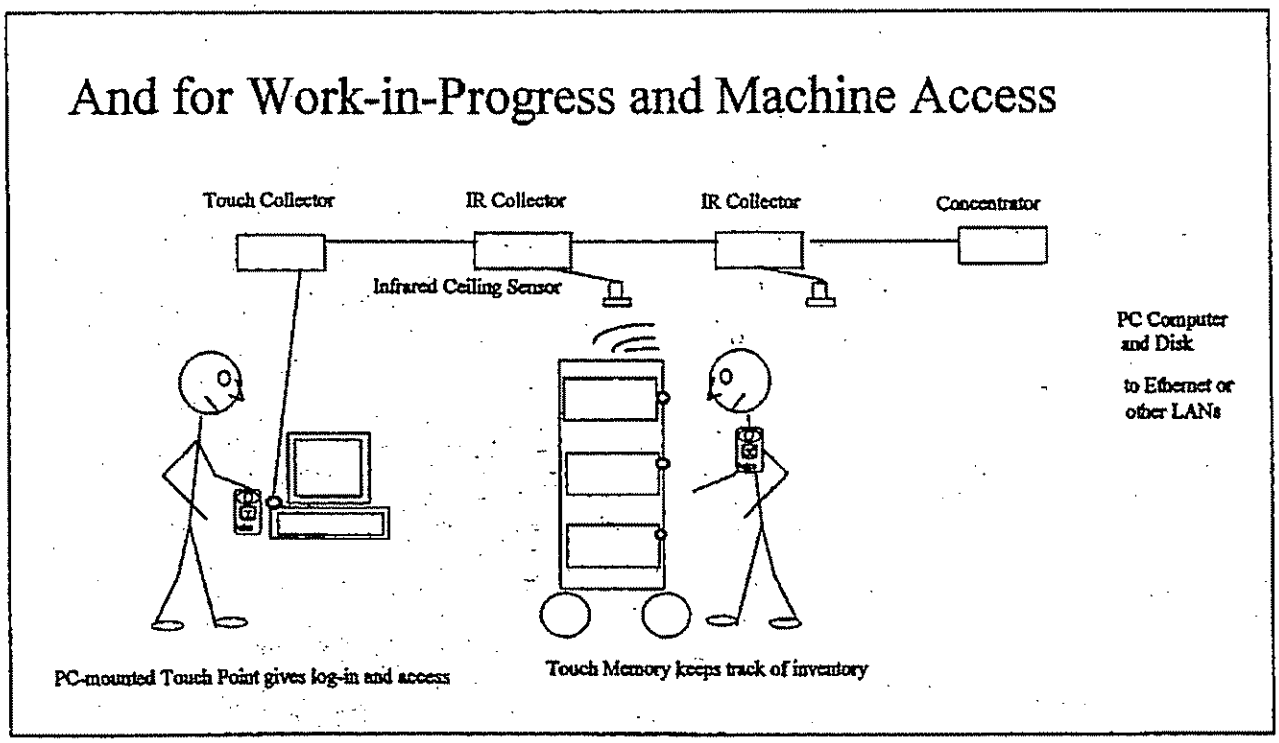
Knowing up-to-the-second personnel



location eliminates area voice paging and reduces call backs and message taking.

In access control and personnel locating, the network must be simple and inexpensive enough to install throughout the offices.

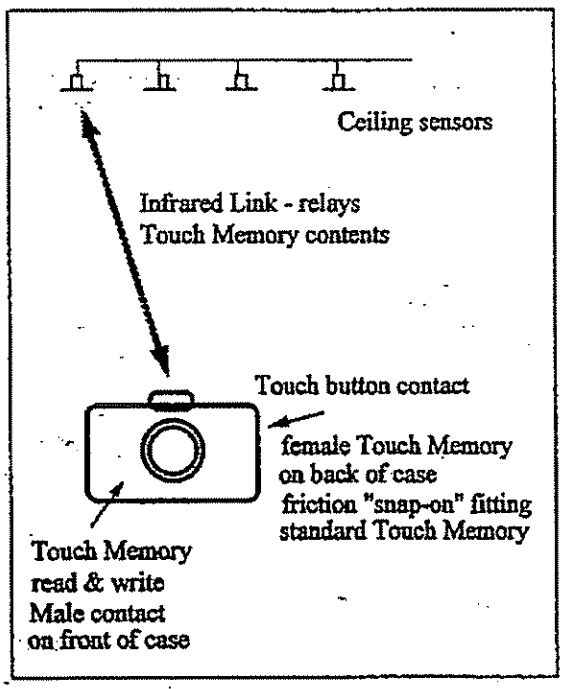
To meet this requirement, TouchPath



has the following design features:

- unshielded, twisted pair wire
- single wire pair from sensors
- in-ceiling network self-powered
- milliwatt-level power consumption
- simple installation
- 225kbps speed (define collector)
- low component cost
- bidirectional data transfer

Two types of data inputs are used: infrared sensors for location determination and memory transfer, and TouchProbe sensors that permit



the Touch Memories to be conventionally accessed.

The Versatile Touch Memory

Touch Memories are super-compact bit (data) containers using advanced semiconductor chip technology. These tiny devices (16mm diameter, 5mm high typically) resemble metal buttons but are actually shipping containers for data. They contain:

- unique, permanently laser-etched 64 bit registration number
- control processor
- 4,096 bits (and up) of read/write memory
- communications channel
- network ready output

Network Ready Output

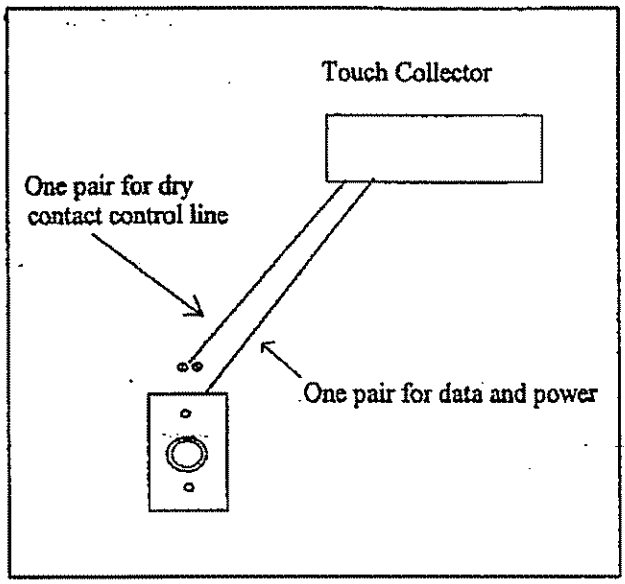
When Touch Memory is issued the proper electrical command, such as by touching it to a TouchProbe, it returns an identification packet that TouchPath may use for access control, location, etc. to individually communicate even when many Touch Memories reside on the same wire.

Because of the simplicity of this Touch Memory/TouchPath interface, the TouchProbe access point can be built simply and at a low cost. Only six electrical components are used inside the TouchProbe and it receives power from the Touch Collector.

This combination of simplicity and low power requirements allows designers to put identification points in places where they formerly could not be economically justified.

A User Defined System

Each TouchProbe has a built-in, permanent, unique address which can be read throughout the network. This allows TouchPorts to be used for essentially any identification-critical application even when they are on the same network.



Typical uses are:

- access or egress control (door mounted with electrical locks)
- guard station reporting (wall mounted)
- time and attendance (bench mounted)
- inventory usage reporting
- machine control

The availability of such a low cost access point opens a variety of applications that were previously hindered by the high read-point cost of magnetic stripe or equivalent systems.

The Intelligent Touch Collector

A significant amount of control capability resides in the TouchProbe/Collector combination.

Indicator lights can be flashed, beeping noise emitted, and a dry contact pair used to open a variety of electric locks.

Additionally, the microprocessor-based Collector contains 30 kbytes of memory which offers a limited amount of independent operation, such as back-up access control, should the inter-Collector wiring become severed.

The combination of TouchPath and Touch Memory gives a far more flexible alternative to bar-coding or magnetic stripe identification.

Connects to Local Area Networks

The data collected through TouchPath is stored on an IBM-compatible personal computer. This data can be simply transferred to other parts of the office over most existing Local Area Networks (LAN). If bi-directional data transfer is desired (such as the application of writing data into Touch Memories), that can also be accomplished over a LAN.

The Automatic Touch

While some applications such as secure-access may require a manual, physical touching of badge to button reader, other applications may benefit from an automatic, hands-free reading of identification.

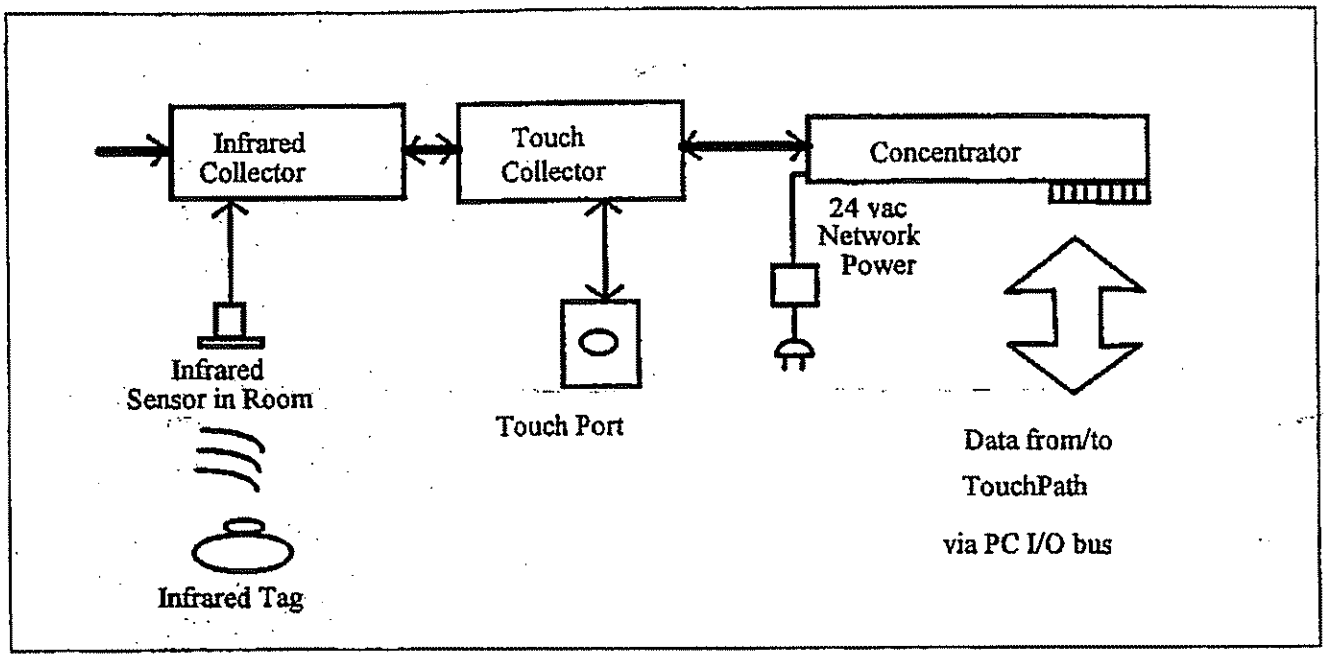
The Infrared Collectors and Tags allow this type of control, and ~~are~~ extremely useful for locating assets and monitoring locations. Systems equipped with both Touch Collectors and Infrared Collectors, using Tags with Touch Memory, can satisfy both the manual and the automatic requirements.

Six Network Components

Only six network components are needed to build a high capacity network.

The functions of the network components are:

Network Component Overview



Infrared Tag (fixed ID) The small infrared tag (called the CallFinder in the PhoneVision system) emits a hemisphere of digitally encoded light. The 42 bit packet contains a fixed 16 bit ID plus other network information. The effective range of the light is about 15 feet.

Infrared Sensor: Several types of sensors are used to receive the tag's infrared signal: single eye, dual eye, and four eye. These sensors convey tag transmission data to the Infrared Collector.

Infrared Collector: Incoming data packets are received by the Collector, buffered and prepared for transfer to the Concentrator. Up to 24 sensors can be connected to one Collector.

Concentrator: The Concentrator continuously scans the Collectors for packets. All collector packets are

received and buffered for I/O transfer to the computer, to an application such as the Touch Logger which makes the data available to software applications. Usually only one Concentrator is used in a network.

Splitter/Repeater: In cases where long wire runs or widespread distribution is needed, the Splitter simplifies wiring by taking one daisy-chain of Collectors and branching off into up to six new daisy-chains (star configuration). No data manipulation is performed.

Infrared Tag with Touch Memory: variety of the infrared tag is produced that reads a defined portion of a Touch Memory and transponds it to TouchPath via the encoded light. The ID of this tag is variable since it simply relays the data of the Touch Memory. The tag is designed to snap on a photo ID badge with an installed Touch Memory. Also called "Skyhook."

TouchPort: The small TouchPort sends and receives Touch Memory packets. Based on a programmable, permanently addressed state processor, the TouchPort also contains control functions.

Touch Memory: The button shaped Touch Memory contains a one-wire signalling bi-directional data communications path, a read/write memory. Up to 4,096 bits and beyond can be stored. The stainless steel container is rugged and waterproof.

Touch Collector: Similar to the Infrared Collector, this Collector allows bidirectional read/write data exchange and control of the TouchPort. Both Touch Collectors and Infrared Collectors can exist within a TouchPath system.

Wiring

Unshielded Twisted Pair

Economy and ease of installation were paramount in the design of TouchPath. Supplies and tools for telephone-type wiring are easily acquired making the choice of 24 awg unshielded twisted pair (UTP) telephone wire a natural selection.

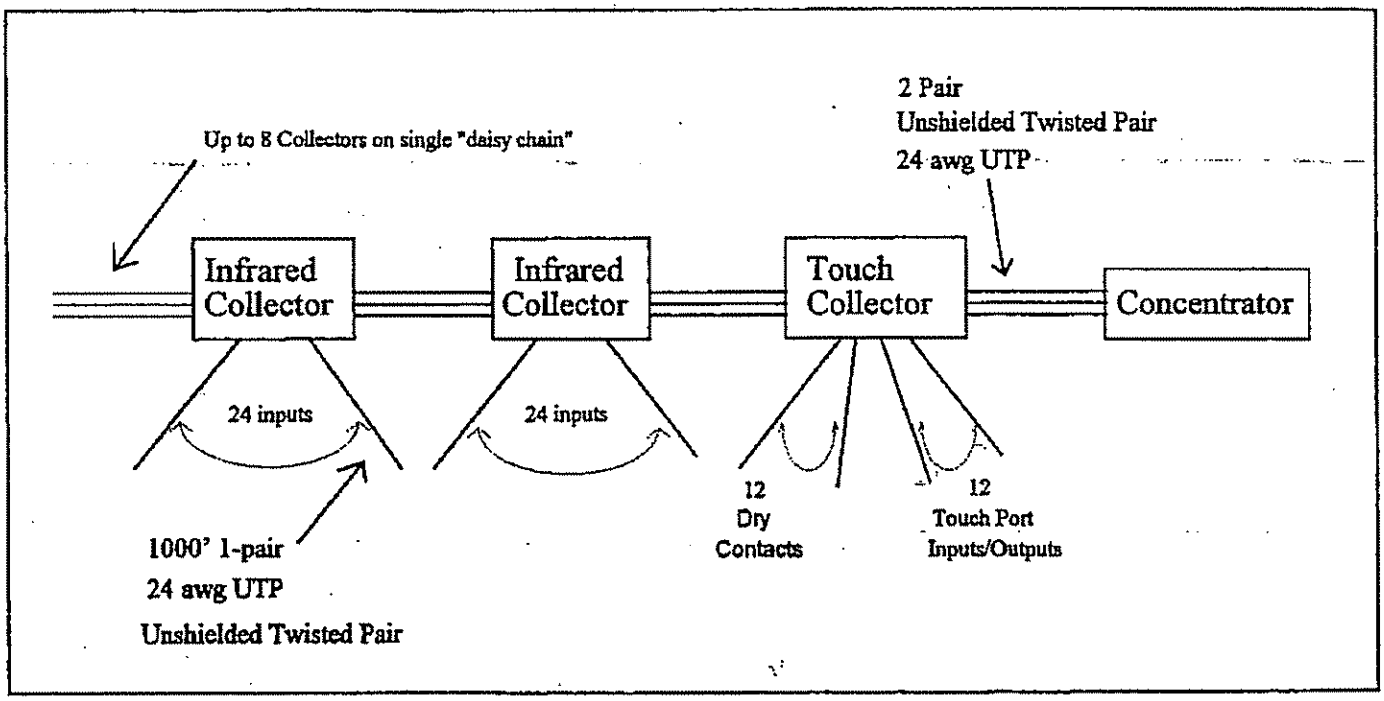
This wire is ideal for a structured wiring environment and simple enough that complex installation techniques are not required.

- unshielded, twisted pair (UTP)
- "punch-down" type wiring block at Collector.
- screw terminals at Sensor

Both data and power are carried on the single pair.

In the Infrared Collector, the sensor wires are unpolarized and may be installed without regard to which wire is connected to which terminal post.

Wire polarity must be observed in the Touch Collector due to increased signalling requirements with the TouchPort.



Sensor to Collector Wiring:

- 1000' maximum run
- star connection
- single pair (2 conductor)
  - data
  - power
- 24 gauge wire

Collectors to Concentrator:

- 1000' nominal wire runs
- daisy-chain (serial) connection
- three pair (6 conductor)
  - data pair
  - control pair
  - power pair
- 24 gauge conductor
- RJ-11 (3P) connectors
- unshielded, twisted pair (UTP)

The connection between the Collectors carries a much higher data rate (225kbps used earlier) than the Sensor-to-Collector connection (660 bps-Infrared, 16.2 kbps-Touch Port), thereby requiring separate pairs of wires for data, power, and control.

Collectors may be powered via the connection to the Concentrator (or Splitter), or via an external power source. If the Collectors are powered by the Concentrator or Splitter, an accumulated distance limitation of 1000' is applicable. (This is the total run length from the Concentrator to each of the Collectors that it is powering.) If longer distances are required, any or all of the Collectors may be individually powered by an external 20 vac source which is usually derived from a wall plug transformer. Both Collector types provide for this external power connection.

Infrared Tag

An Infrared Tag for Personnel or Equipment Locating

This small, lightweight tag emits invisible, digitized infrared light. It can be clipped to clothing, glued to a photo ID badge, or attached to equipment. A badge clip is provided for attachment to shirt pockets.

The tag broadcasts a 42 bit data packet at fixed intervals or continuously when movement is sensed by the built-in motion sensor.

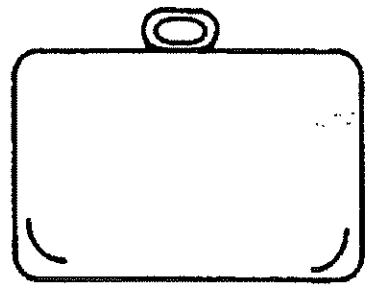
When motion is detected, the tag emits a signal every 2.5 seconds for 20 cycles. If no further motion is detected, it reduces the emissions by adding 2.5 seconds until the tag emits every 12 minutes. This greatly extends the internal battery life without inhibiting timely location information.

An internal lithium battery powers the microprocessor-based tag. Life spans of one year are typical. The battery can be replaced using simple shop tools.

Each tag is factory manufactured with a fixed 16 bit identification number which is labeled (in hexadecimal) on the outside.

The tag body is constructed of acrylic plastic which appears black but is transparent to the infrared light. If held up to a strong light, the case color appears dark red.

The general range of the tag's emission is considered to be 15'. However, longer distances can be achieved through the addition of small acrylic lenses which serve to focus any received infrared energy into the aperture of the ceiling sensors.

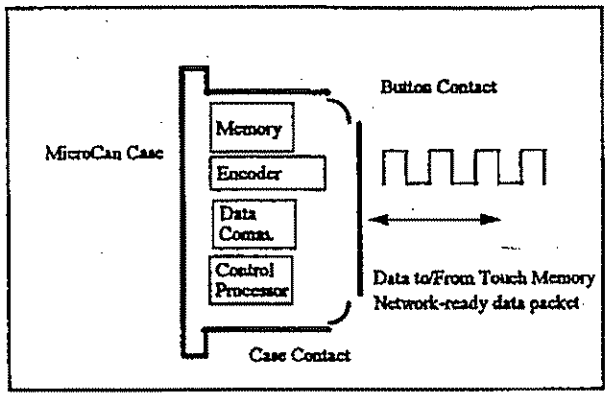


Specifications: CallFinder Tag 3.4

Size:	2 3/8" x 1 7/16" x 7/16"
Weight:	24 grams (without clothing clip)
Output:	Digitized infrared light, non-visible
Frequency:	880 nanometers
Range:	20+ feet
Peak Output:	0.3 watts, ± 5%
Angle:	125 degrees by 200 degrees exit of light. Approx. hemisphere of output.
Transmission intervals:	
	2.5 second in motion
	25 minutes stationary
Battery life:	approx. 1 year on personnel
	approx. 3 years on equipment
ID:	16 bits fixed packet:
	42 bits total
Data rate:	660 bps
Housing:	dark red acrylic plastic

Touch Memory

A dime-sized technological marvel, Touch Memory is manufactured by Dallas Semiconductor. A significant technical achievement, Touch Memory is a completely encapsulated, network-ready, data storage device with a unique



registration (id) number.

In many applications, the need to affix an identification label to a person or object is important. Cars have license plates, people have social security numbers and there are hundreds of other applications. For use as an electronic key, the Touch Memory can be mounted on a keychain or attached to a photo identification badge.

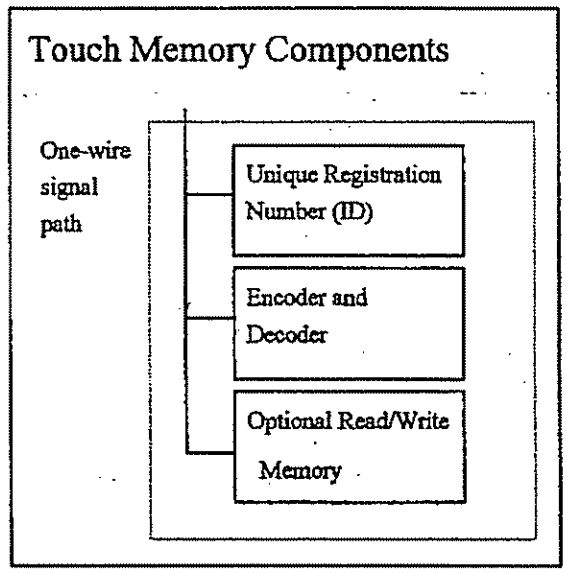
Conventional ways to automatically identify someone or something had been to use bar-codes, magnetic stripe readers, radio proximity badges, and other methods. Each of these methods has strengths and weaknesses.

Magnetic stripe cards, for example, are low cost in themselves, but are easily damaged and can be copied. Readers for the magnetic stripe cards are expensive.

Touch Memory

The Touch Memory "button" contains a variety of components chip with the following features:

- permanent, laser (registration) number
- built-in multidrop network controller
- read/write memory
- bidirectional data communications
- control processor
- sealed MicroCan



Network-Ready Identification

Operation of Touch Memory is elegantly simple: the MicroCan is briefly touched to a small metal cup and the identification number is automatically generated in digital format, ready to be transmitted to where the information is desired.

The lid of the can provides one conductor, the rim and back of the can provides a ground.

This method of producing the data is called "one-wire" signalling. The MicroCan has, essentially, an unlimited lifetime. The intelligence of the Touch Memory permits the TouchProbe to be simple and inexpensive.

Touch Memory can be expanded to have non-volatile memory, a clock more ten and even an internal temperature sensor. If these features are present, an internal lithium source supplies power for than nine years of operation.

The registration number will always be available, even if the lithium supply is exhausted. An other type second family of Touch Memory products contain the registration number and user-programmable memory referred to as "add-only" or EPROM-based Memory. This allows the user to continue to add data to the device, up to the capacity limit, but not change any data that has already been wirtten.

Touch Memory's ability to almost instantly generate a packet of network-ready data makes it a perfect addition to the TouchPath network.

All the logic needed to read and write Touch Memory is contained in the Touch Collector and the corresponding TouchPort.

Specifications: Touch Memory

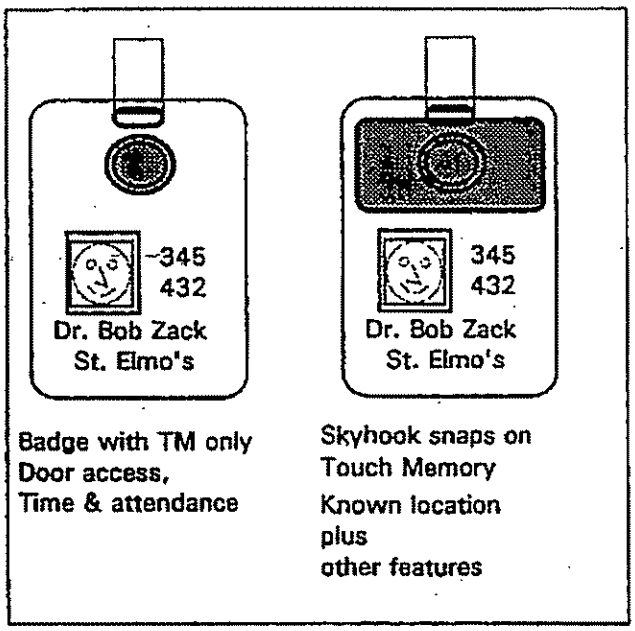
Memory:	up to 4,096 bits,and beyond
Data rate:	16.4 kbps (nominal)
Housing:	stainless steel container
Size:	16mm can
Registration number:	64 bits, never duplicated, laser etched ROM

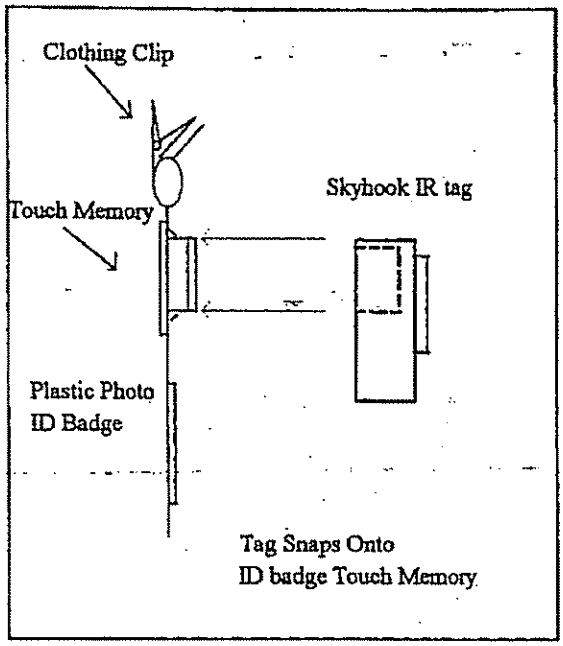
Note: Touch Memory requests-for-id are initiated and powered as a result of receiving a send request from the 1-wire signal (TouchPort or other compatible device). Some Touch memory features such as hour meter, random number generated for password security, and active data files stored in SRAM and are backed up with a lithum cell for more than ten years.

Photo ID Badge with Touch Memory Tag "Skyhook"

Photo ID Badge with Skyhook IR Link

The Touch Memory Tag combines the benefits of Touch Memory with the transmission capabilities of the Infrared Tag. This tag gets its identification from the Touch Memory, and communicates this ID to the TouchPath network via infrared





light. The tag may also communicate with TouchPath by touching its Touch Memory to a TouchProbe.

On one side of the Tag is a male contact Touch Memory for issuing the Tag ID to TouchPorts. On the other side of the Tag is a female friction "snap-on" fitting. This side may be used to attach the Tag to another Touch Memory, such as the Touch Memory on an ID badge. In that case the Tag takes its identification from the Touch Memory on the ID badge.

Specifications: ID with Touch Memory

Size: 2 3/8" x 1 7/16" x 7/16"
Weight: 27 grams (no clip)
Output: Digitized infrared light, non-visible
Frequency: 880 nanometers
Range: 20+ feet
Output: .3 watts, ± 5%
Angle: 125 degrees by 200 degrees
Transmission intervals:
2.5 second in motion
25 minutes stationary
Skyhook/Battery life:
Approx. 1 year

Infrared Sensors

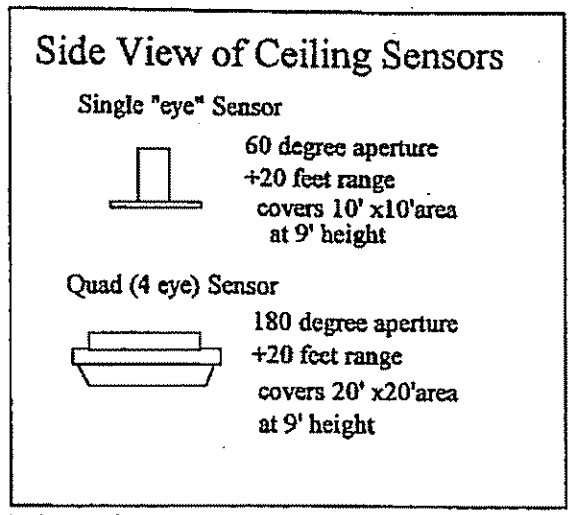
Infrared Sensors

The Infrared Sensors convert the encoded infrared signals emitted by the tags into electrical signals which are transmitted to an Infrared Collector via a single twisted pair connection.

Each sensor also receives its operating power across this same pair.

The Infrared Sensors come in three varieties:

- A SINGLE (one-eye) sensor, which is used to provide coverage in a typical office area,
- A DUAL (two-eye) sensor, which is great for hallways or long narrow areas (like the aisles between shelves in a stocking room), and
- A QUAD (four-eye) sensor, which is excellent for large areas like conference rooms, shipping and receiving areas, or odd shaped areas.



All sensors utilize:

- Unshielded twisted pair wiring,
- Silicon dioxide, solid state junction infrared detectors, and
- Modulated current loop transmission path technology.

Sensor Specifications:	Single Eye	Dual Eye	Quad Eye
Size:	2 3/16" x 3 5/8"	2 3/4" x 1"	2 3/4" x 1"
Reception angle:	60¤	180¤ x 30¤	180¤
On-Axis reception distance:	15' typ.	15' typ.	15' typ.
Half Angle (30¤) reception:	7.5' typ.	12' typ.	12' typ.
Power Consumption	60mW	80mW	120mW
Idle voltage: 10.2 vac	13.3 vdc typ.	10.2 vdc	same
Required Wiring:	26 awg UTP	same	same
Distance:	1000' max.	same	same
Housing:	Very dark red acrylic plastic		
Installation Method	Push nut	Screw plate	Screw plate

Infrared Collector

The Collector receives data packets sent by the sensor and stores them in a 42 bit buffer until passed to the Concentrator.

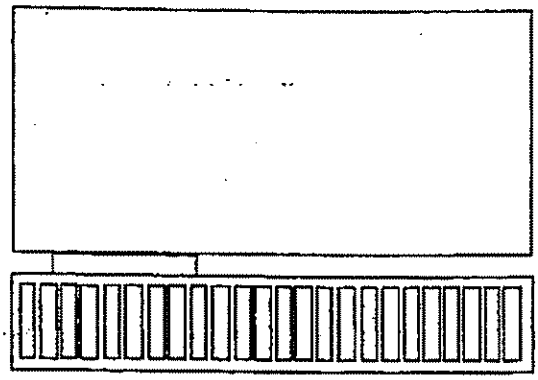
The Collector can accept either single, dual, or quad type infrared sensors.

While not described in this catalog, there is an optional High Resolution sensor which can resolve a room area down to 2 feet. This type of sensor contains a built-in Collector and is wired in series with the other Collectors.

The microprocessor-based Collector contains both RAM and ROM. A partial list of its functions include:

- error checking
- sensor mask resolving
- self test of processor, RAM, ROM, power, and data ports

Infrared Collector



Specifications: Infrared Collector

Inputs:	24 sensors, (single, dual, or quad type)
Power:	30vdc (via concentrator) 20vac external (optional)
Data Rate:	660 bps (sensor link) 250 kbps (inter-collector net)
Buffering:	42 bit tag packets, 16 packets
Connections:	daisy chain between collectors, star to splitters.
Wire:	2 pair UTP (intercollector net)
Distance:	accumlated run lengths = 1000' max
Maximum # of collectors:	16,000
Connection:	Punch-down or RJ-11

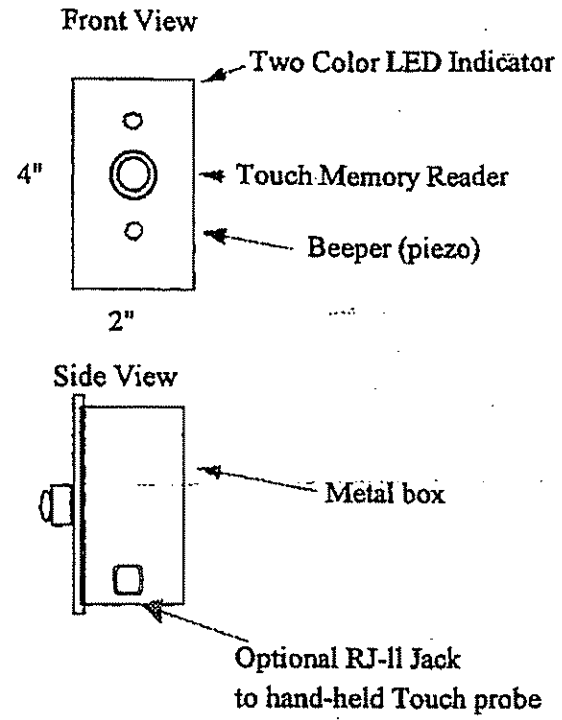
TouchProbe

Certified to Dallas Semiconductor's specifications for accessing Touch Memory, the TouchProbe is the basic access method for physical (touch) reading and writing of Touch Memories.

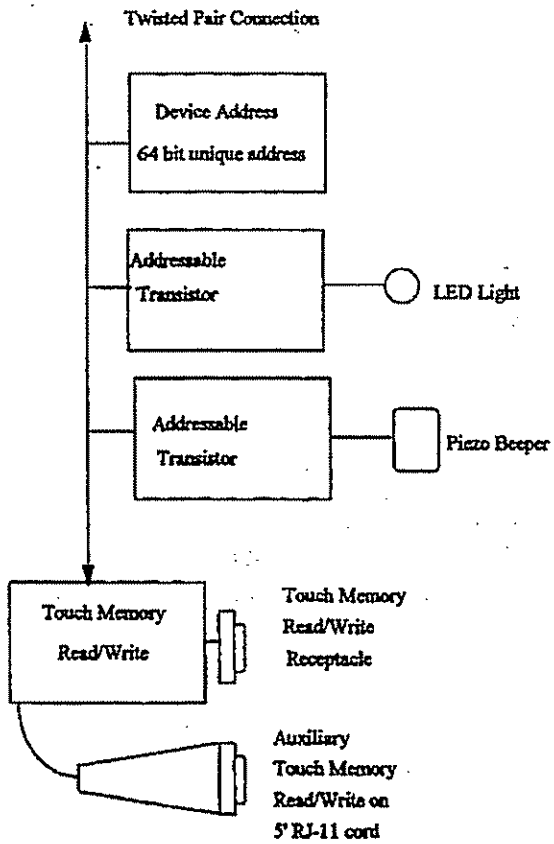
The TouchProbe is a simple device with a small number of parts. Its simplicity provides a powerful and inexpensive access and control function tool.
The TouchPort's simplicity is derived from the Touch Memory's ability to generate a network-ready packet of information; the TouchPort has only to pass the packet on to the Touch Collector, where TouchPath can use the information as needed.

TouchPort

Physical Appearance



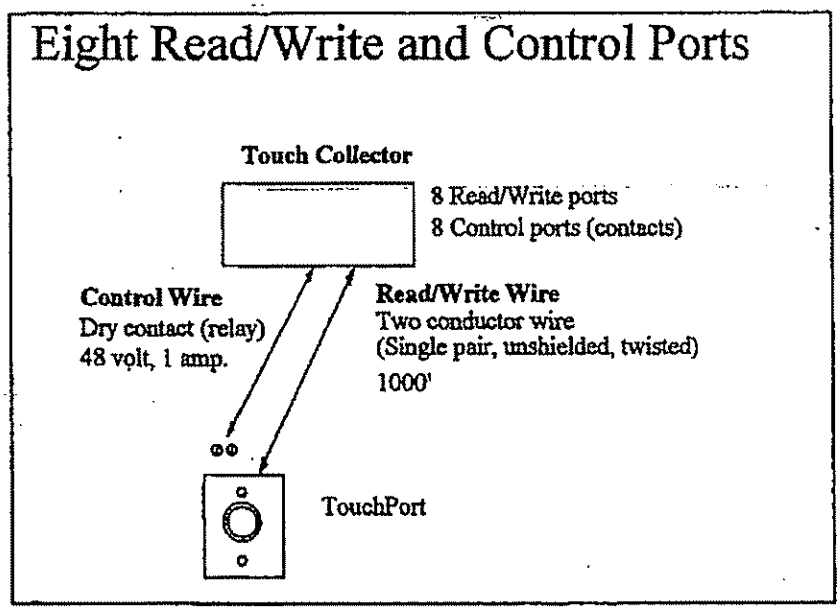
Internal Functions



Specifications: Touch Port

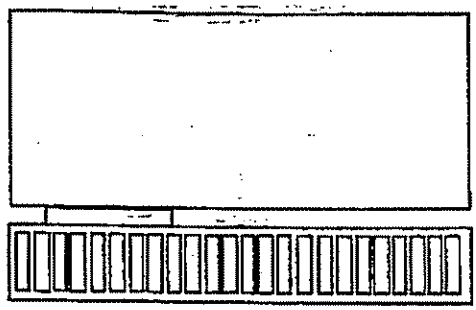
Input: Touch Memory contact
Output: two wire to Touch Collector

Power: supplied by Touch Collector
Data rate: 16.3 kbps
Address: unique, 64 bit, laser etched
Light: internal, LED, flashing and steady
Sound: internal beeper
Housing: steel box
Faceplate: standard chrome
Distance: 1000'



Touch Collector with Memory

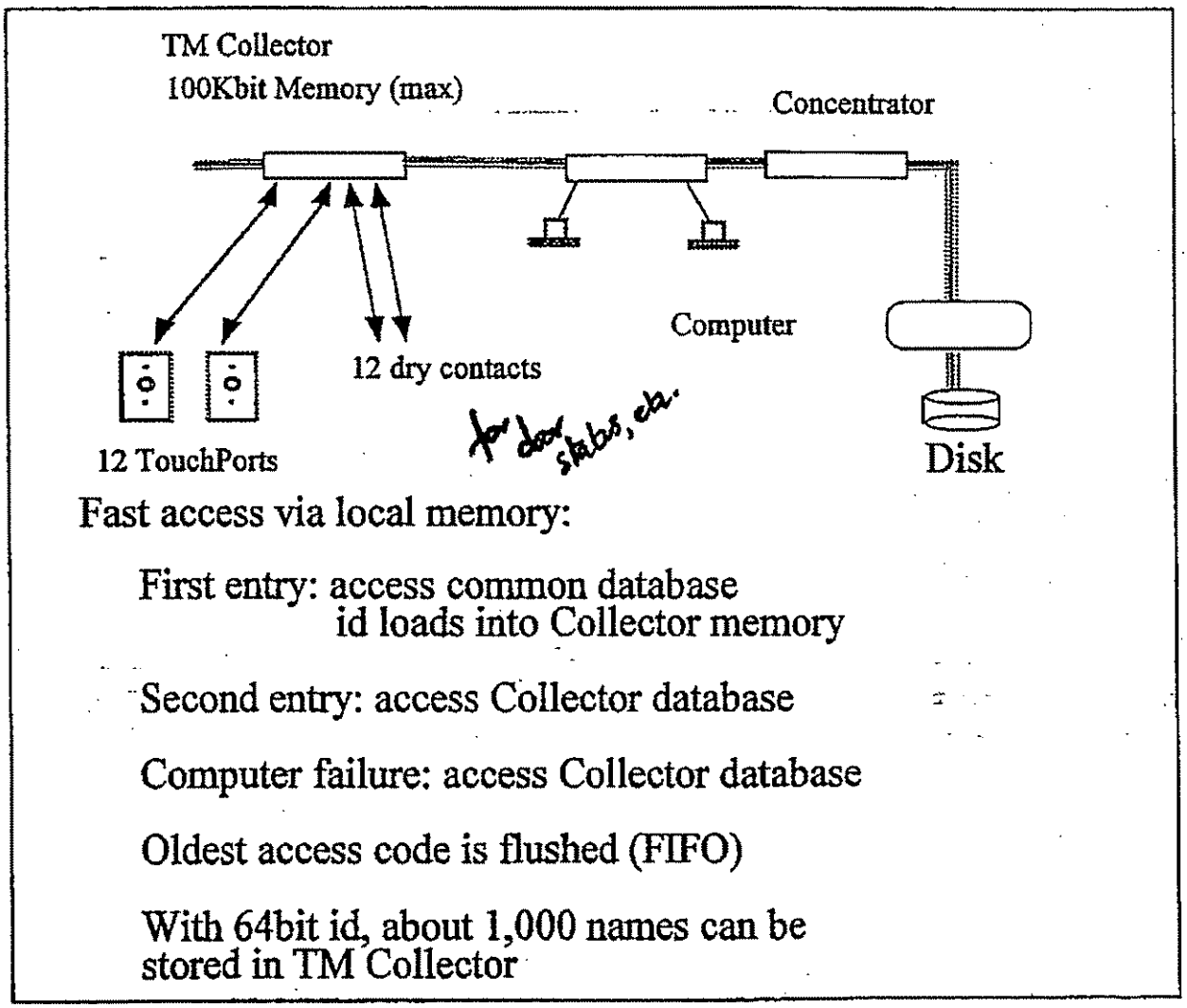
Touch Collector



The Touch Collector is similar to the Infrared Collector, except that the input structure is specifically designed to meet the Touch Memory signaling protocol. Otherwise, the specifications and signaling methods are the same as the Infrared Collector. Externally, the two Collectors appear identical.

The Touch Collector contains additional memory for the purpose of containing the latest names or id's of personnel. In case the inter-Collector wiring is severed, the Touch Collector would be able to operate autonomously in a limited mode to permit access at a door.

As personnel request entry via the TouchPort and the central computer or



Fast access via local memory:

First entry: access common database id loads into Collector memory

Second entry: access Collector database

Computer failure: access Collector database

Oldest access code is flushed (FIFO)

With 64bit id, about 1,000 names can be stored in TM Collector

access controller grants access, these identifications are stored locally in the Touch Collector. If commmunications with the central computer are lost, the personnel who have been locally stored are granted access.

When this type of operation is desired the Touch Collector must be locally powered since a severed wire would cut the source of network power.

On request, a 24 Touch Memory input-only model is available, for time and attendance or inventory control applications. This specification covers the standard 8 port, 8 contact model.

Specifications: Touch Collector 2.0

Inputs:	8 touch ports, 8 touch contacts (24 touch ports optional)
Power:	30vdc (via concentrator) 20vac external (optional)
Data Rate:	16.3 kbps (touch-port link) 250 kbps (inter-collector-net)
Buffering:	30 kbits
Connections:	daisy chain between collectors, star to splitters.
Wire:	2 pair UTP (intercollector net)
Distance:	accumulated run lengths = 1000 ' max
Maximum number of collectors:	30,000

Connection:Punch-down or RJ-11

IR/Control/TouchPath Collector

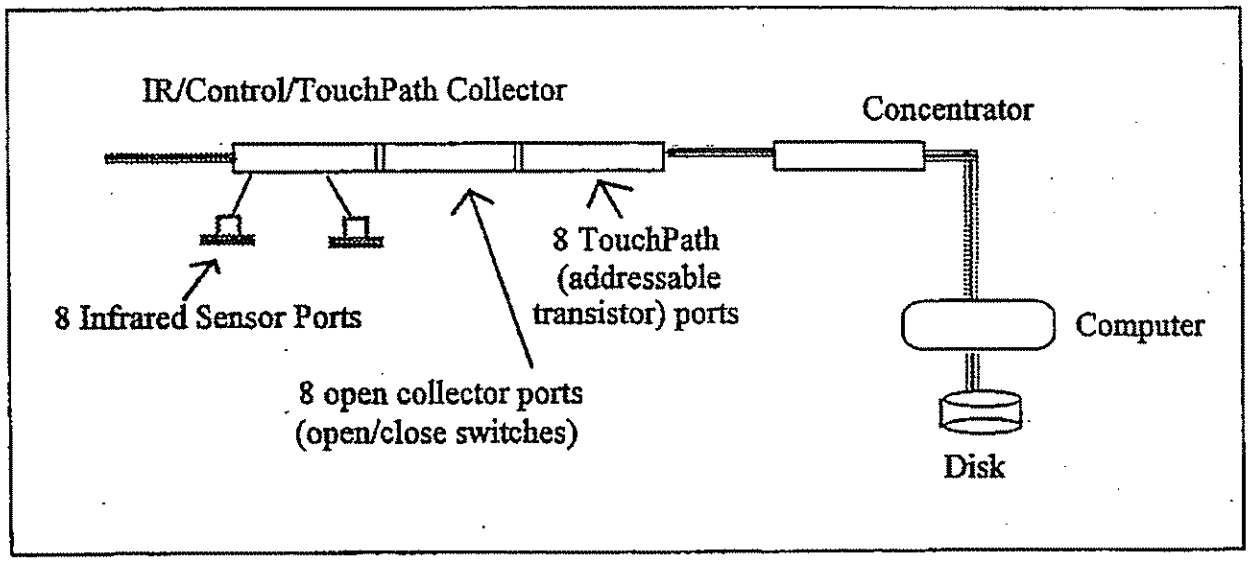
This Collector is similar to the Infrared sensor Collector used in the PhoneVision system but also includes additional control and sensing functions.

Infrared Locating: Eight Infrared sensor ports are provided and accommodate single, dual, or quad sensors in the same manner as the IR-only Collector for the purpose of personnel or equipment locating with the CallFinder infrared tag.

Control Outputs: Eight ports are provided with Open Collector switching. (off = open, on = closed). This solid state latching switch is rated at 50 volts and 0.5 amperes, resistive. The switches are ideal for operating relays or controlling lamps. Each switch is given a unique address such that the number of Collectors can be greatly expanded with out concern to addressing limits.

IR/Control/Touch -Path Collector

TouchPath (Addressable Transistor) Remote Control & Sensing: Eight ports provide TouchPath two-wire signalling protocol for use with addressable transistors. These uniquely addressed transistors can be located up to 500' from the Collector over a single, twisted pair wire. Each port accommodates up to eight Addressable Transistors for a total of 64 of the devices on each Collector.



The Addressable Transistor can be used for either sensing or low-power control. Typically, the devices are used for sensing door position (open, closed) or lamp signalling.

All outputs are wired to a standard 50 pin connector (Telco-type) which may connect

to a punch-down block or screw-terminal wiring block.

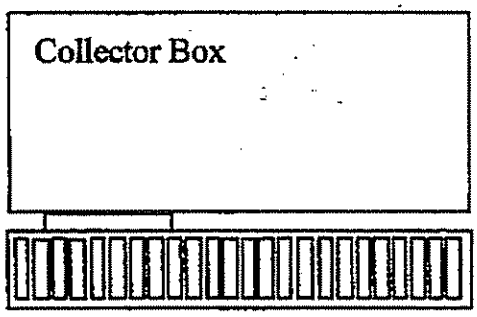
Externally, this Collector appears identical to the IR-only Collector.

The IR/C/TP Collector is microprocessor-based and contains 128kbytes of memory for system and user programs. Typically, this memory is divided as 64k for Collector programs and 64k for user data.

Programs and data are loaded via the network from the Concentrator. The Collector is powered by a wall-plug transformer with 24 volts ac.
In case the inter-Collector wiring is severed, the Collector would be able to operate autonomously is a limited mode.

In a typical application, when personnel wearing code-numbered infrared tags approach an entry portal, the IR Port associated with the entry makes a local Collector inquiry to determine if access is allowed and triggers the Control ports appropriately.

If no local determination can be made, the Collector has the option of inquiring the Central computer data via the network.



Punch-down block

Local autonomous operation is generally preferred to continual network queries in order to continue operation if communications with the central computer are lost.

The IR/C/TP Collector may be used as a standard component of an IR-only network.

Software supplied with the IR/C/TP Collector is the standard software supplied with PhoneVision. Additional documentation supplied describes how to program the IR/C/TP Collector for other operations such as access control.

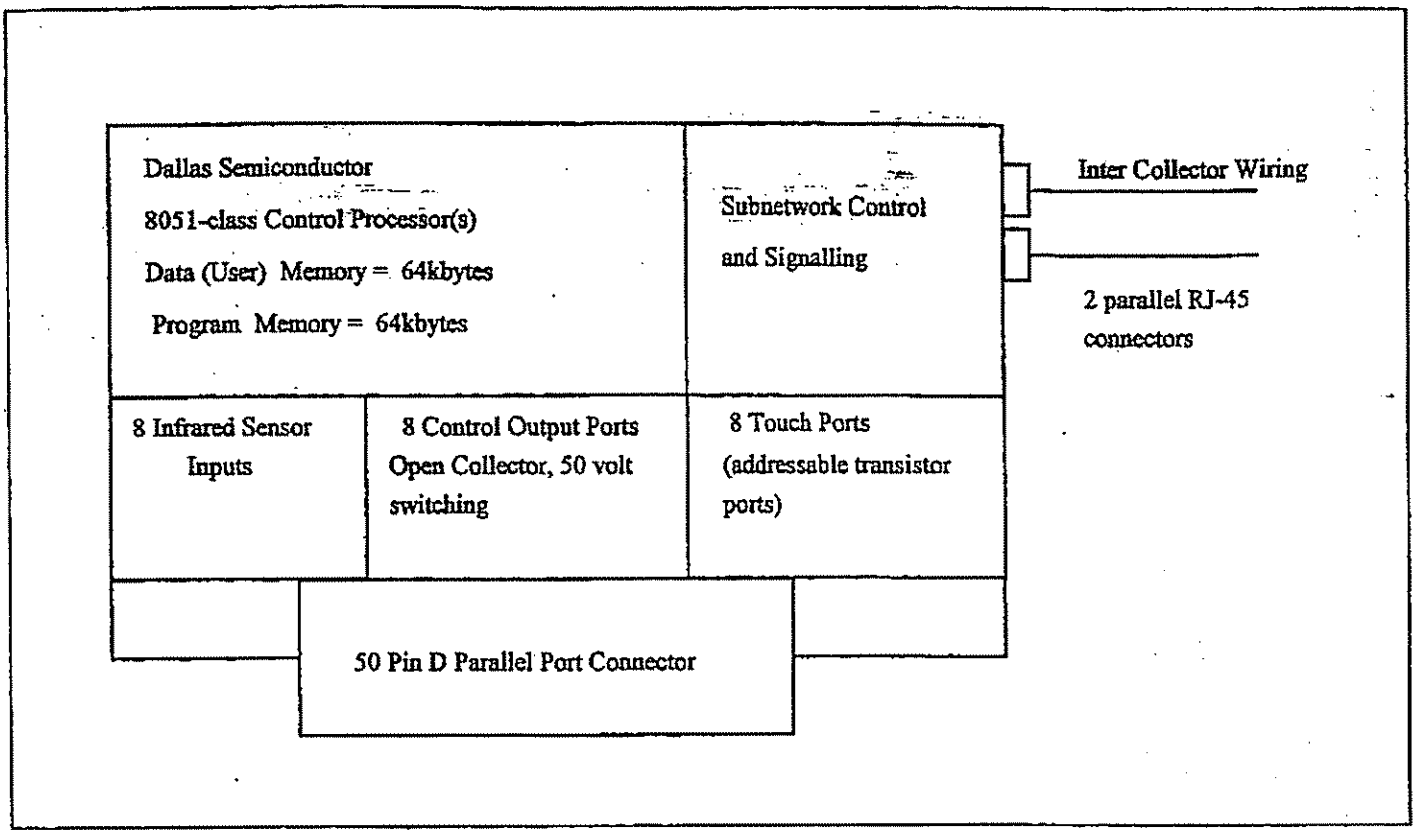
No application-specific software for this Collector is supplied.

Specifications: Infrared/Control/Touch- Path Collector 1.0

Basic Functions:
8 Open collector (50v) control ports
8 TouchPath ports
8 Infrared sensor inputs

Power:
24vac external (optional)

Data Rate:
16.3 kbps (TouchPath link)



250 kbps (Inter-Collector network)

Connections:
Two RJ-14 connector for two-wire connection of inter-Collector network. (Daisy-chain)

External Connections:
50 pin Telco connector either push-down or screw terminal block

Inter-Collector Wiring:
2 wire twisted pair, 24 awg or better (UTP)

Sensor-to-Collector Wiring:
Single twisted pair, 24 awg or better (UTP)

Collector to Concentrator Distance:
accumulated inter-Collector run lengths = 1000 ' max.

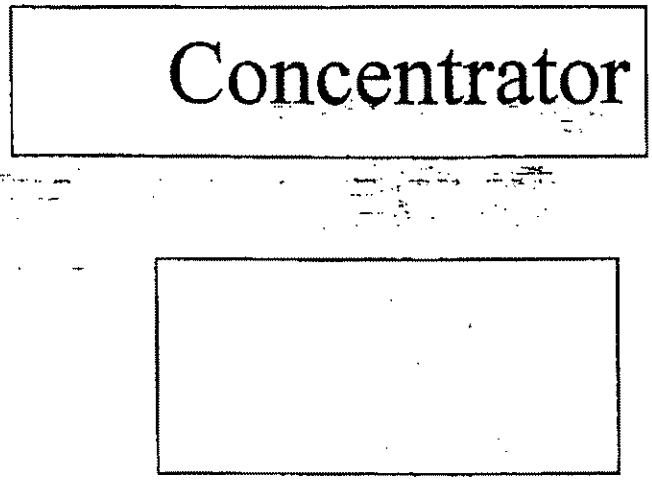
Software:
PhoneList
Logger
PhoneMap
PhoneZone
PhoneGroup
PhoneTalker

Firmware:
Documentation supplied describing Inter-Collector command and control procedures. No application-specific programs are available for this Collector

Concentrator

The Concentrator gathers all the data collected by Touch Collectors and IR Collectors, then sends it to a personal computer which logs or otherwise makes use of the data. The Concentrator connects to a Collector or Splitter, beginning the daisy-chain comprising the TouchPath network.

Two models are available: an Internal Concentrator that fits into a slot inside the computer, and an External Concentrator which is an external box, connecting to the computer via a coaxial cable. Both types are functionally similar.



Specifications: Concentrator

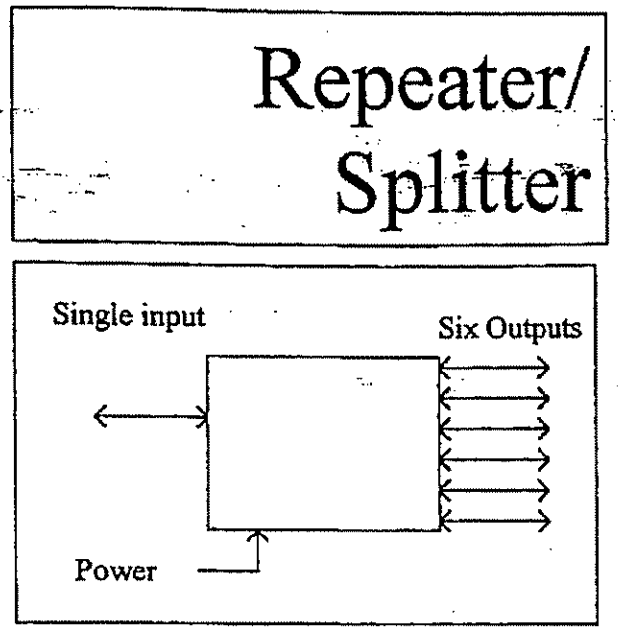
Inputs:	From last Collector or Splitter
Size:	9" x 5" x 1.5"
Weight:	1.5 lbs.
Power:	20 VAC, 2.5 watts, from all transformer
Data input:	250kbps
Data output:	Balanced RS-485, baseband NRZ
Output rate:	2.5 Mbps milli or mega
Data density:	4 bytes per tag report packet 6 bytes overhead/packet 126 reports/packet
Buffering:	8,120 reports Connection to
Sub-net:	RJ-11, 2 pair Connection to
PC interface:	BNC - RG-62a/u (or PC Bus) or direct ISA plug-in board.

Splitter

At sites where strict daisy-chaining would be inconvenient or inefficient, or where long wire-runs are required, a Splitter may be used. The Splitter branches a daisy-chain connection into up to six other chains, allowing a star configuration.

The Splitter uses external power which permits the Collector-to-Collector distance of 1000' to be exceeded. Essentially, the Repeater/Splitter is a passive device since the data contents are unchanged. However, the device receives and regenerates the TouchPath data signals so far greater distances can be achieved.itter can supply the boost needed.

A Splitter may be connected to another Splitter if needed to extend the overall system configuration.



Specifications: Splitter

Inputs: One (from Concentrator)

Outputs: Six (to Collector)

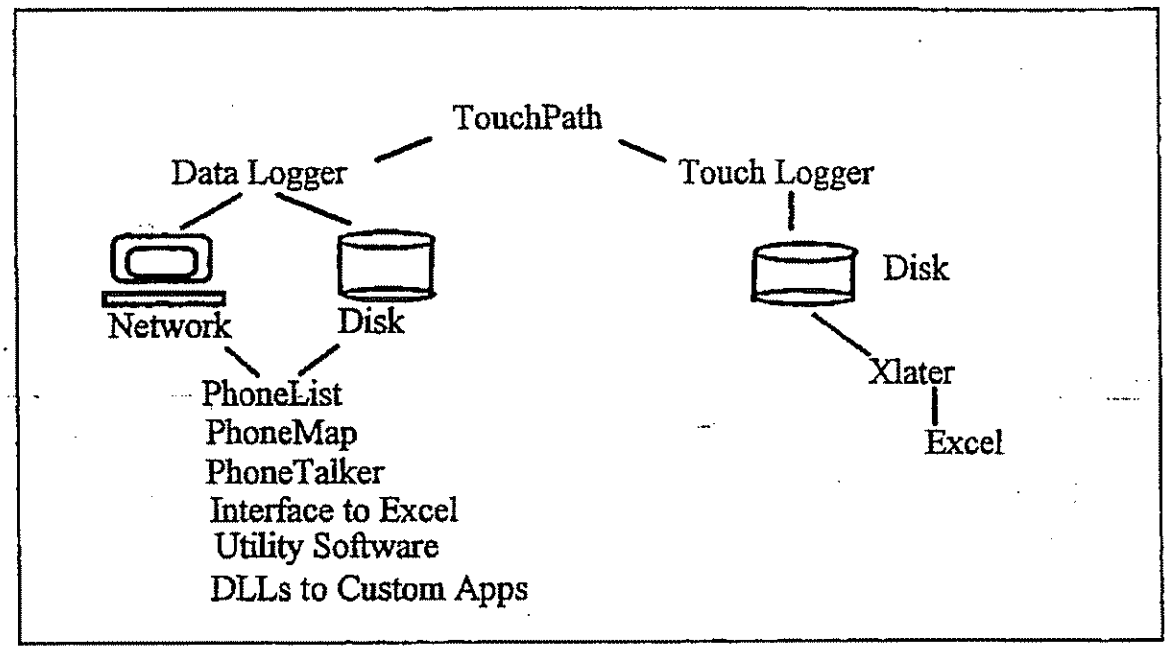
Power: 24 vac, plug-in transformer

Distance: 1000' max from Concentrator or other Splitter/Collector

Access to Data

Software is available to make TouchPath effective immediately. To tailor TouchPath to your particular application, tools are available to aid custom programming around the data.

Software Component Overview



The functions of the software components are:

Data Logger: The Data Logger performs location processing and logging on TouchPath data.

Touch Logger: The Touch Logger logs Touch Memory arrivals and departures within the TouchPath system.

Xlater: Xlater filters and translates output from the Touch Logger into a file readable by Excel or other applications.

PhoneList: PhoneList displays on the computer screen current location and phone extension for people and equipment.

PhoneMap: PhoneMap shows current locations graphically, using a floorplan view.

PhoneTalker: PhoneTalker provides current location and phone extension for people and equipment, using a phone rather than computer display.

Interface to Excel: Location data may be imported into an Excel-compatible spreadsheet for analysis.

Utility Software: Several programs allow access to different aspects of the TouchPath system, such as defining tagged equipment and room locations.

DLLs for Custom Apps: Custom applications may easily access the location data through DLL function libraries.

Data Logger

From Tag to Computer

The Data Logger software receives data from TouchPath Concentrators and processes it into location information. Logger then logs that information to disk and sends NetBIOS messages for application programs that want realtime position updating. Logger is the link between TouchPath and applications that require location information. (For Touch Memory data access, see Touch Logger.)

Specifications: Logger 3.21

Command line options:

-a(ccelerated) no disk writes
-b(ucket) debug statistics
-c(ount) control silent tag checking
-d(ebug) full display of logger logic
-f(ile logging) store debug display
-i(nterval) set sync message time
-j(itter) fine tune hi-res analysis
-l(imited debug) display tag transmits
-q(uiet) suspend Netbios updates
-s(tatistical) debug profiler
-z report stats even if within tolerance

Files needed:

errmsg.txt,
daqtype.arg
config.bin
tagasset.arg

Files written to:

error.log
A0000000n.tag
asset.arg
tagasset.arg

Memory requirement: 4 Megabytes
Dedicated hardware: Internal Concentrator, or one dedicated interface card

Additional software required:

NETBIOS
Windows 3.X

Win.ini controls:

copyGroups=PhoneList
dcmStat=60
conbus=10
toktime=10
databus=10
dir=c:\phonevis
dogPort=0x2f0
dogTime=300
jitter=0
logger=Logger
motion=yes
sendGroup=Argus
silent=300
syncTime=5000
track=current

Win.ini settings for the ARCNET card:

cmdAddr=0x2e0
bufAddr=0xd000
cmdType=IO
bufType=MEM

Touch Logger

From Touch Memory to Computer

The Touch Logger software receives data from TouchPath Concentrators and logs the Touch Memory activity. The data goes to a disk file in the form of Touch Memory arrivals and departures, showing the Touch Memory ID, TouchProbe ID, date and time. Touch Logger is the link between TouchPath and applications that require Touch Memory information. (For location data access, see Data Logger.)

The Touch Logger can be configured to accept event reports from any specific category, based upon the "category" settings in the WIN.INI [TLOGGER] section.

Specifications: Touch Logger 1.0

Command line options:
none

Files needed:
tlogger.exe

Files written to:
<mmddyyyy>.log

Memory requirement:
2Mb minimum (Windows Standard)

Dedicated hardware:
Internal Concentrator, or
one dedicated ARCNET card.

Additional software required:
Windows 3.X

The Win.ini settings are shown below:

Win.ini controls:

[TLOGGER]
extension=(default=.LOG)
category=(ex. 1,2,4,7, no default)
dir=(default=C:\)
CmdAddr=(no default)

Finding a Person's Current Location

PhoneList Software

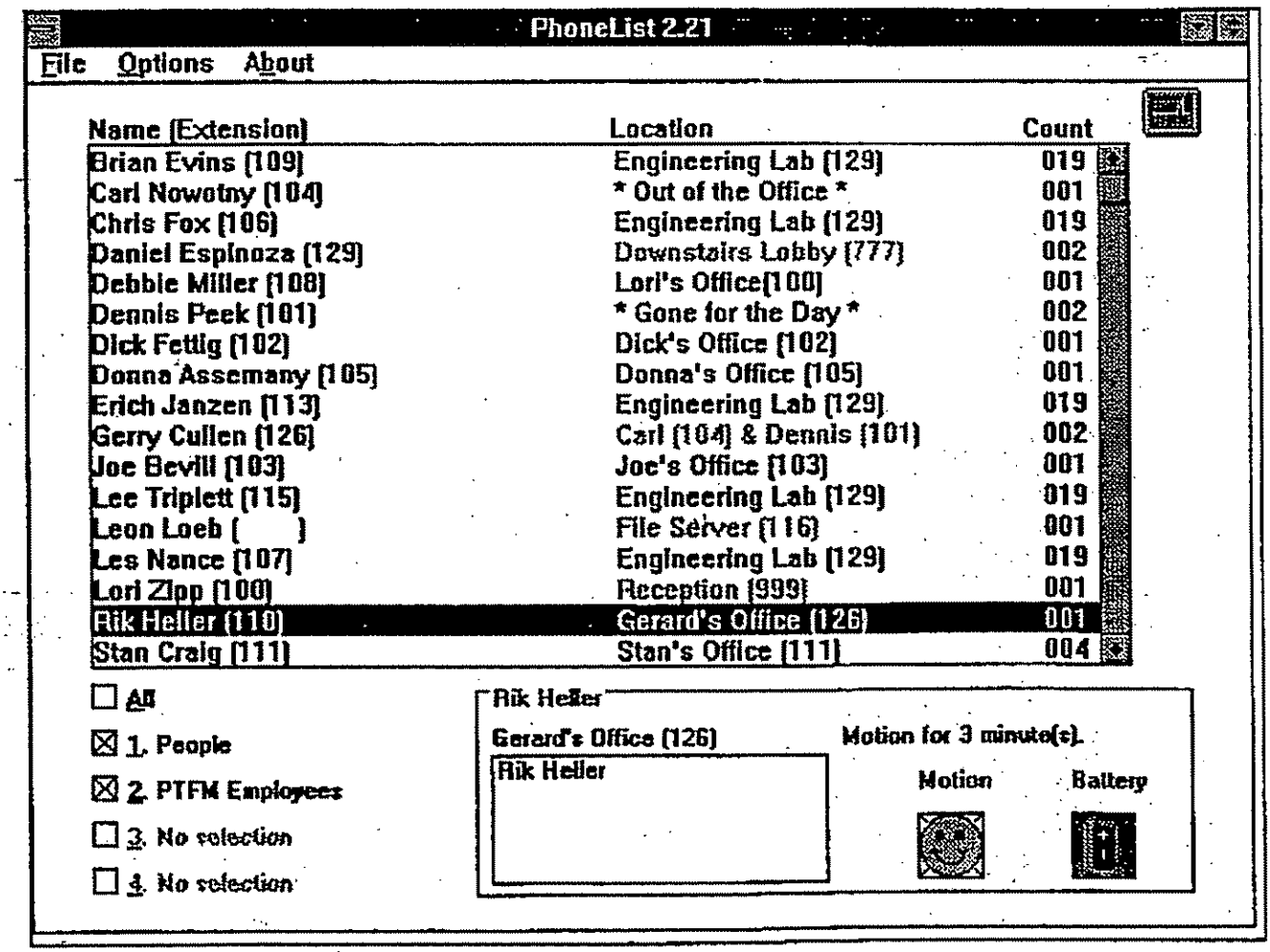
This program displays a "living" directory which shows the current location of people or equipment and the closest telephone extension to them.

PhoneList is the most frequently used software since it can handle multiple floors and hundreds of personnel.

The receptionist or other user simply types in the first letter of the name and the screen reflects all the names beginning with that letter. Another innovation is the ability to know the occupants of a specific room which allows the user to check and see if a meeting is in progress before transferring a call there.

The network "heartbeat" indicator constantly reports on the status of the in-ceiling sensor network by use of a small, green pulse on a monitor icon.

The list is updated every time a person (i.e. tag) moves, as determined by the Data



Logger.

Specifications: PhoneList 2.21

On screen listings: 17 max

Scrolled listings: 32,000

Display elements: Heartbeat
Personnel Names
Assigned Extensions
Room Names
Current Extensions
Room Occupants
Battery Conditions

Keystroke selection by first character

Command line options:
-l name(saves screen configuration in file called "name" file)

Files needed: wbtrrcall.dll
vbrun200.dll
ptfmbin.dll
ptfmbtrv.dll
ptfmnet.dll

Files written:
phlist.log

Memory requirement:~2 Megabytes

Dedicated hardware: none

Additional software required:
NET BIOS
Windows 3.X

Win.ini controls: heartbeat=no
phlog=phlist.log

Locating Someone by Phone

PhoneTalker

PhoneTalker is an integrated voice response system that provides automated infrared tag location and zone occupancy information from a PhoneVision system to a customer phone system.

PhoneTalker uses a Dialogic voice I/O board to provide all required telephone signaling and call progress monitoring. The PhoneTalker software uses information from the Dialogic board as well as data stored by the Data Logger to provide asset (person or equipment) location to callers via the Dialogic board's digitized voice playback feature.

The tag and location voice playback is stored on a local disk, and can be recorded manually by the installer, or via prerecorded prompts provided by the end-user.

The PhoneTalker system can provide two different operational capabilities, based on the type of boards installed. With all Dialogic boards, users can access the PhoneTalker system and obtain audible, up-to-date location or zone occupancy on a specific infrared tag.

When using Dx1/ series Dialogic boards, the user can also request a call transfer to the phone extension nearest the current location of the located person. This feature is called Call Progress Analysis.

By using Call Progress Analysis, the Dialogic board can determine whether or not an attempted transfer has been successful (call answered, extension busy, extension ring-no-answer) and provide the user with additional options, such as a transfer to another extension, the phone system's voice mail, or an operator's extension.

PhoneTalker for PhoneVision combines the location features of PhoneVision with the Integrated Voice Response of Dialogic boards to produce an interactive location finding interface to standard automated attendant environments, with the ability to automatically locate assets and switch incoming calls to the nearest phone system extension.

Specifications: PhoneTalker

Max incoming analog lines:	2 (D2x/D) or 4 (D4x/D)
Max # of voice prompts:	typically limited by available disk space.
Max # of voice menu options:	3 (fixed by software)
Display elements:	Assets (By Name) Locations (By Zone) Assigned Extensions Line Status Total Line Accesses

Recorder Control
Buttons

Command line options:
none

Files needed: phtalk.exe
phtalk.ini
asset.db
asset.idx
zone.exe
zone.idx
*.vox

Files written: debug.log

Memory requirement: ~2 Megabytes

Dialogic hardware: D21/D, D41/D

Additional software required:
NET BIOS
Windows 3.X
Dialogic D4x drivers

Win.ini controls:
none

Graphic Map View of Locations

PhoneMap shows locations of people or equipment graphically by displaying a floor plan-style view of the offices, with tags represented by icons.

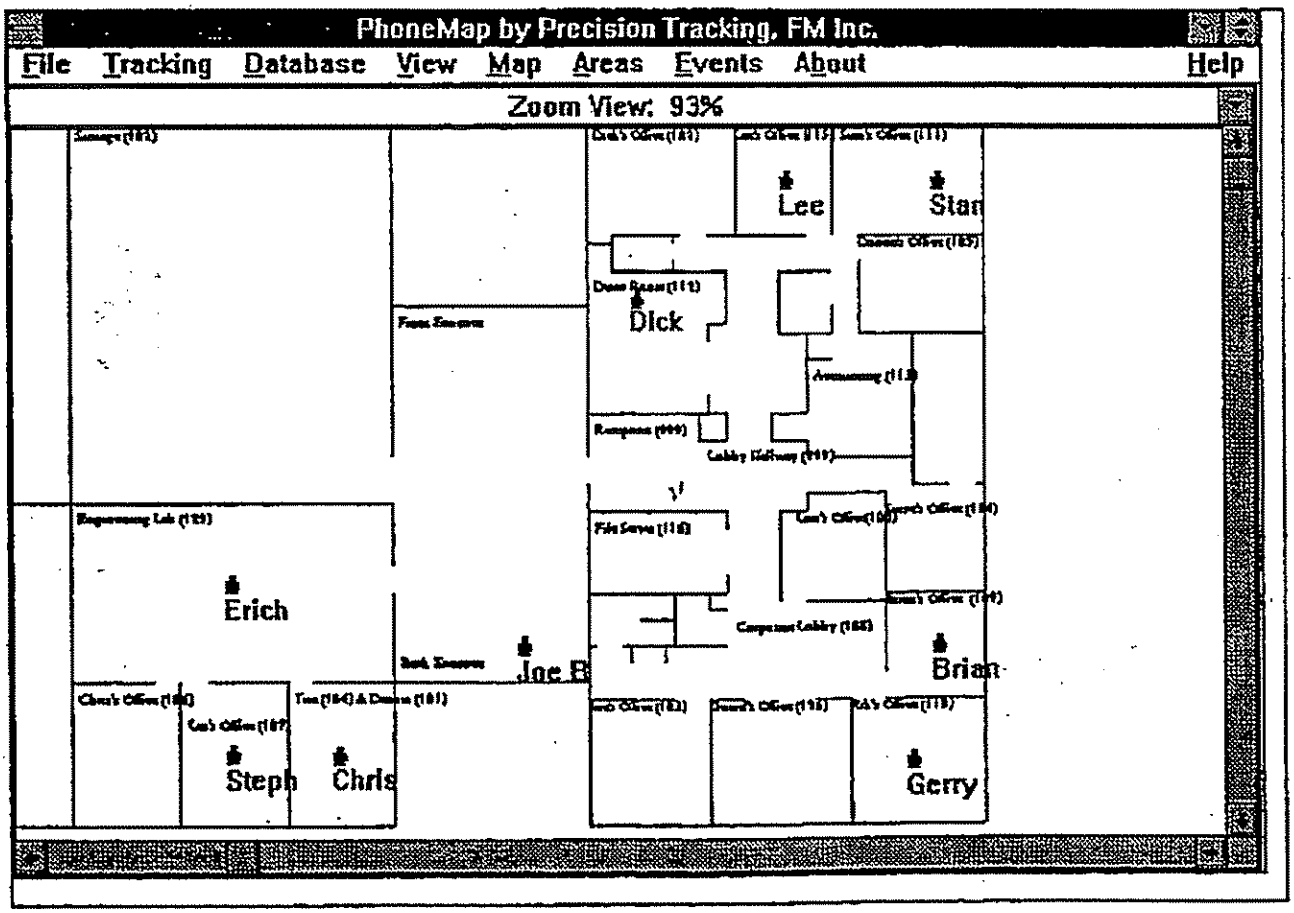
PhoneMap also allows you to define new personnel or equipment for location tracking, change Group and Tag assignments and alter the map of room names and phone extensions.

PhoneMap Software

Specifications: PhoneMap 3.11

On screen icons: ~30 simultaneous

Display elements: Wide View (overall map)
Zoom View (rooms)
Data View (tracked items)
Pull-down menus



Command line options:

-l name (saves personal info to file)
-p path (states directory for personal file saving)

Files written:

asset.arg
tagasset.arg
group.arg
grouprel.arg
config.bin
daqtype.arg

Memory Requirement: 4 Megabytes

Additional Software required:

NETBIOS
Windows 3.x

Win.ini controls:

dir=c:\phonevis
parms=c:\phonevis
caption=name
netbuf=8

Data to the Excel Spreadsheet

Three software programs are available for getting TouchPath data into the Excel spreadsheet, depending on whether you want current location information, historical locations, or Touch Memory accesses.

PhoneServer provides real-time current positions to the Excel spreadsheet. With PhoneServer running iconically, you can request in your Excel spreadsheet to see the location, tag state, and room count for any tag.

PhoneSheet allows you to select data about locations over time, and store it as a file that can be imported into Excel. You could then use Excel to determine what percentage of time a person or piece of equipment has spent in a particular room or area.

Xlater takes the output of the Touch Logger and creates an importable file of more meaningful data. With the supplied cross-reference utility, you can supply meaningful names for Touch Memory IDs that are recorded by the Touch Logger. You could then import this data into Excel to do time and attendance logging.

Excel Interface Software

Specifications PhoneServer

PhoneServer requires a fully installed and functioning PhoneVision system in order to be effective.

Files needed:
- srvmsg.txt
- netpost.dll
- ptfmbtrv.dll
- ptfmbin.dll
- ptfmnet.dll

Specifications PhoneSheet

No command-line options.
Files needed:
- wbtrvcall.dll
- vbrun200.dll
- ptfmbtrv.dll
- ptfmbin.dll
- history data files

Files written:
comma-delimited
text file

Memory Requirement: ~2 Megabytes
WIN.INI controls:
inputdir=
outputdir=

Additional software required:
Windows 3.X

Specifications Xlater

No command line options.

No WIN.INI options.

Files needed:
btrcall.dll
vbrun200.dll
xref.dll

Files written:
comma delimited
text file

Memory Requirement:
~2Megabytes

Additional Software Required:
Windows 3.X

Utility Software

An assortment of smaller, utility software programs comes with a PhoneVision system.

PhoneEntry is a program for entering and maintaining information about people or equipment being located. PhoneEntry allows assignment of a particular tag to a named person or object, as well as assigning them a "tracking ID", usually the person's assigned phone extension. You can look up entries by name, tag ID, or tracking ID (ie. phone extension), or you can select them from a list.

PhoneTag is similar to PhoneEntry, but scaled down for everyday use by the receptionist or system administrator. PhoneTag allows you to assign a tag to a person or thing and place that person or thing in a group, all by simply entering their name and the tag ID.

PhoneGroup is a program for defining and maintaining Groups of people or equipment being tracked. Defining Groups helps in selecting people or equipment to locate when using PhoneList or PhoneMap.

PhoneZone allows you to define the areas or room names to use with PhoneList or PhoneTalker when reporting the location of someone or something. A unique feature of PhoneZone allows you to place a tag under a sensor, then enter the name of the room it is in, to define that location for the PhoneVision system.

Utility Software

Specifications for the Phone Tools

Command line options: PhoneTag uses the group name as a command line option

No WIN.INI options

Files needed:	wbtrcall.dll vbrun200.dll ptfmbtrv.dll ptfmbin.dll ptfmnet.dll
Files written:	group files (PhoneGroup and PhoneTag) asset.arg (PhoneEntry) zone files (PhoneZone)

Memory Requirement: ~2Megabytes
Additional Software Requirements:
Windows 3.X

Developer's Tools

DLLs for Custom Software

Several Dynamic Link Libraries, or DLLs, are available to facilitate custom software programming efforts using TouchPath location data.

The Binary File Interface Library contains functions for access to the binary files in the system, including the positional history files and area definitions.

The Btrieve File Interface Library contains functions for access to the Btrieve files in the system, including definitions of people, equipment, groups and tag assignments.

The Netbios Interface Library provides functions for programmers to take advantage of system network messaging that enables realtime update reporting of locations of people and equipment.

Specifications: Binary File Interace

readPublicZones
pubZoneCount
pubReadCount
pubFilePath
zoneFromPt
zoneData
firstZoneAtPt
nextZoneAtPt
namedZoneAtPt
modifyZone
newZone
deleteZone
zoneIdxName
saveSealPublic
assetXYZ
assetCurrentRec
assetXYZData
openHistoryFile
closeHistoryFile
assetFirstRec
assetNextRec
assetPreviousRec
assetLastRec

Specifications: Btrieve File Interace

openAssetFile
closeAssetFile
assetByName
assetByID
assetByBarCode
assetByTag
firstAsset
nextAsset
assetFilePath
updateAsset
deleteAsset
insertAsset
newAsset
makeNewAssetFile
openTassFile
closeTassFile
readFirstTass
readNextTass
writeTass
readTass
deleteTass
makeNewTagAssetFile
openGroupFile
closeGroupFile
groupByName
groupByID
firstGroup
nextGroup
groupFilePath
newGroup
updateGroup
deleteGroup
makeNewGroupFile
groupAssets
groupAssetOnly
groupSubGroups
openGroupRelFile
closeGroupRelFile
newMember
deleteMember
deleteAllMembers
makeNewGroupRelFile

Specifications: Netbios Interace

initLoggerNetbios
getLoggerMsg
stopNetbios
tellLogger
getLastError
clearNetbiosName
cancelPendingMsg
NetbiosPresent
setNetbiosName
setNetbiosGroup
sendNetbiosMsg
listenForNetbios
getNetbiosMsg

Calculating Network Response

Calculating Network Response

With small data packet sizes and its fast connection link, TouchPath provides a quick and reliable channel.

The timesshown below are representative of a 64 Collector connection.

The disk time of 1/2 second is a conservative estimate and includes indexing and disk lookup time.

Event	Time (sec.)
1. MicroTerminal to TM Collector	> .001
2. Collector scan (240 scans/sec.)	.100
3. SubNet transfer time (25,000 char/sec) with 64 Collectors	.001
4. I/O time into PC	.002
5. Data processing and disk access time (assumed)	.500
6. I/O time into PC	.001
7. SubNet transfer time	.001
8. Collector scan	.100
9. MicroTerminal to TM Collector	> .001
10. Operate relay	.001
11. Disable latch	.001
	Total time: .709